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#### INTERIM TEST RESULTS REPORT FOR HURLBURT FIELD FIRE TRAINING AREA (SITE FT-39) EGLIN MAIN OLD FIRE TRAINING AREA (SITE FT-28) EGLIN AFB, FLORIDA

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### INTERIM TEST RESULTS REPORTS FOR HURLBURT FIELD FIRE TRAINING AREA (FT-39) EGLIN MAIN OLD FIRE TRAINING AREA (FT-28) EGLIN AFB, FLORIDA

An initial bioventing pilot test was performed at the Hurlburt Field Fire Training Area (FT-39) and the Eglin Main Old Fire Training Area (FT-28), Eglin AFB, Florida during the period of March 14, 1994 to March 24, 1994. The purpose of this Part II Report is to describe the results of the initial pilot tests and to make specific recommendations for extended testing to determine the long-term performance of bioventing in remediating site contaminants. Descriptions of the history, geology, and site contaminants are contained in the Test Work Plan (ES, 1993).

#### 1.0 PILOT TEST ACTIVITIES

#### 1.1 Hurlburt Field Fire Training Area (FT-39)

#### 1.1.1 Pilot Test Design and Construction

In accordance with the Test Work Plan, one vertical air injection vent well (VW) and three multiple-depth soil vapor monitoring points (MPs) were installed the week of February 28, 1994. A 1.0-horsepower regenerative blower was installed at the VW to provide the necessary air for bioventing. Figure 1.1 depicts the locations of the VW, MPs, and blower at the FT-39 site. Figure 1.2 depicts the vertical hydrogeological cross section around FT-39. The following sections describe in more detail the final design and installation of the bioventing system.

#### 1.1.2 Vent Well Construction

The VW was installed on March 1, 1994 in an area of documented high TPH contamination. The VW was constructed of 4-inch diameter Schedule 40 PVC with a slot size of 0.04 inches. The total depth of the VW was 8.0 feet below ground surface (bgs), with a screened interval from 8.0 to 3.0 feet bgs. The annular space between the well casing and the borehole was filled with 6-9 silica sand from the bottom of the boring to approximately 2.5 feet bgs. Granular bentonite was placed above the sand pack from 2.5 feet bgs to 1.5 feet bgs and hydrated in place with potable water. The VW was finished with 0.5 foot layer of sand upon which a 12-inch flushmount protective well cover was cemented in place with approximately 1 foot of cement/bentonite grout. A detail of the VW construction is presented on Figure 1.3.

#### 1.1.3 Soil Vapor Monitoring Points

Three soil MPs were installed at 10, 20 and 40 feet radially away from the air injection vent well. Each MP was constructed to provide multiple depth soil gas

monitoring with two discrete sample points at 3.5 to 4 feet and 5.5 to 6 feet bgs. A small variation to this sampling interval was made at the outermost MP because of changes in elevation. Each discrete point was constructed of a six-inch long piece of 1/2-inch diameter Schedule 40 PVC well screen with 0.02 slot size. The riser of each discrete point was constructed of 1/2-inch Schedule 80 PVC, which extended to approximately six inches bgs.

Clean 6-9 silica sand was placed around each discrete point to provide a filter pack between the borehole wall and the point. Granular bentonite was placed both below and above each discrete point to provide an air tight seal between the points. The bentonite was placed in 12-inch lifts and hydrated in place to assure the proper seal. The top of each discrete point riser was fitted with a 1/4-inch quarter turn ball valve and 3/16-inch hose barb to allow for connection of appropriate monitoring instruments.

Additionally, Type K thermocouples with mini connectors were installed at the 4 feet and 6 feet bgs discrete monitoring points in the MP closest to the VW (MPA). These thermocouples will be used to measure the temperature profile at the site. The top of each MP was completed with a 12-inch flush mounted protective well cover set in a concrete base. Figure 1.4 shows the construction of the soil vapor monitoring points.

#### 1.1.4 Blower Unit Installation

A one-horsepower GAST® regenerative blower unit was installed at FT-39 for the initial and extended pilot tests. The blower was installed in a weather resistant enclosure and electrically wired for permanent 240-volt, 30-amp service. Air from the blower is injected into the vent well via a two inch PVC line connected to the blower's exhaust port. A diagram of the blower unit and installation is presented on Figure 1.5.

#### 1.2 Eglin Main Old Fire Training Area (FT-28)

#### 1.2.1 Pilot Test Design and Construction

In accordance with the Test Work Plan, one vertical VW and three multiple-depth MPs were installed the week of February 28, 1994. A one-horsepower regenerative blower was installed at the VW to provide the necessary air for bioventing. Figure 1.6 depicts the locations of the VW, MPs and blower at the FT-28 site. Figure 1.7 depicts the vertical hydrogeological cross section around FT-28. The following sections describe in more detail the final design and installation of the bioventing system.

#### 1.2.2 Vent Well Construction

The VW was installed on March 1, 1994 in an area of documented high TPH contamination. The VW was constructed of 4-inch diameter Schedule 40 PVC with a slot size of 0.04 inches. The total depth of the VW was 40 feet below ground surface (bgs), with a screened interval from 5 to 40 feet bgs. The annular space between the well casing and the borehole was filled with 6-9 silica sand from the bottom of the boring to approximately four feet bgs. Bentonite chips were then placed above the sand pack in one foot lifts to a depth of two feet bgs. Each lift of bentonite chips was hydrated in place with potable water. A 1.0 foot layer of sand was placed above the bentonite. The VW was finished with a one foot layer of cement/bentonite grout above the sand and

around a 12-inch flushmount protective well cover. The well cover was cemented in place with the cement/bentonite grout. A detail of the VW construction is presented on Figure 1.8.

#### 1.2.3 Soil Vapor Monitoring Points

Three MPs were installed at 10, 20 and 40 feet radially away from the air injection vent well. Each MP was constructed to provide multiple depth soil gas monitoring with three discrete sample points at 4.5 to 5, 25.5 to 26 and 38.5 to 39 feet bgs. Each discrete point was constructed of a six-inch long piece of 1/4-inch diameter Schedule 40 PVC well screen with 0.02 slot size. The riser of each discrete point was constructed of 1/2-inch Schedule 80 PVC, which extended to approximately six inches bgs.

Clean 6-9 silica sand was placed around each discrete point to provide a filter pack between the borehole wall and the point. Granular bentonite was placed both below and above each discrete point to provide an air tight seal between the points. The bentonite was placed in 12-inch lifts and hydrated in place to assure the proper seal. The top of each discrete point riser was fitted with a 1/4-inch quarter turn ball valve and 3/16-inch hose barb to allow for connection of appropriate monitoring instruments.

Additionally, Type K thermocouples with mini connectors were installed at the 39 feet and 5 feet bgs discrete monitoring points in the MP closest to the VW (MPA). These thermocouples will be used to measure the temperature profile at the site. The top of each MP was completed with a 12-inch flush mounted protective well cover set in a concrete base. Figure 1.9 shows the construction of the soil vapor monitoring points.

#### 1.2.4 Blower Unit Installation

A 1.0-horsepower GAST® regenerative blower unit was installed at FT-28 for the initial and extended pilot tests. The blower was installed in a weather resistant enclosure and electrically wired for permanent 240-volt, 30-amp service. Air from the blower is injected into the vent well via a two inch PVC line connected to the blower's exhaust port. A diagram of the blower unit and installation is presented on Figure 1.5.

Prior to departing the site, the ES engineer provided an operations and maintenance briefing, O&M checklist, and blower maintenance manual to the base point of contact.

#### 2.0 PILOT TEST SOIL AND SOIL GAS SAMPLING RESULTS

#### 2.1 Hurlburt Field Fire Training Area (FT-39)

#### 2.1.1 Soil and Soil Gas Sampling Results

Soils at the FT-39 site consist of fine to medium brown sands. This soil profile was consistent throughout the unsaturated zone and to approximately five feet below the groundwater surface which was encountered at approximately 8 feet bgs.

Hydrocarbon contamination at the site appears to extend from the ground surface to the groundwater table. Contaminated soils collected by split spoons during the VW and MP installations were identified based on visual appearance, odor and photoionization detector (PID) screening. Varying degrees of hydrocarbon staining were encountered

throughout the vertical profile in the unsaturated soil zone, and light to strong hydrocarbon odors were noticed in nearly all the split spoon samples. PID readings of greater than 20,000 ppm were measured in a number of soil samples.

Soil samples for laboratory analysis were collected in brass liners inserted into stainless steel split spoons during the VW and MP installations. Procedures for soil sample collection specified in the Protocol Document (Hinchee, et. al., 1992) were followed for all sample collections. Samples were collected from the 6 to 8 feet interval from the VW, from the 3 to 5 feet interval in MPA, and from the 5 to 7 feet interval in MPB. All split spoon samples were screened for VOCs by use of the PID to determine the presence of hydrocarbon contamination and to select samples for laboratory analysis.

Soil gas samples were collected prior to performing the air permeability test in laboratory provided, evacuated Summa® canisters. Soil gas samples were collected from the VW, the 3.5 to 4 feet bgs discrete monitoring point at MPA, and from the 3.5 to 4 feet bgs discrete monitoring point in MPC. All soil gas samples were collected following procedures in the Protocol Document.

The soil samples for laboratory analysis were placed on ice and shipped via Federal Express® to the PACE Inc., Laboratory in Huntington Beach, CA. Each soil sample was analyzed for total recoverable petroleum hydrocarbons (TRPH); benzene, toluene, ethylbenzene, and total xylenes (BTEX); iron; alkalinity; total Kjeldahl nitrogen (TKN); pH; phosphates; percent moisture; and grain size distribution. Soil gas samples were placed in a shipping box (without ice), and shipped via Federal Express® to Air Toxics, Inc., in Folsom, CA for total volatile hydrocarbon (TVH) and BTEX analysis. The analytical results for these soil and soil gas samples are presented in Table 2.1.

#### 2.1.2 Exceptions to Test Protocol Document Procedures

There were no exceptions to the Test Protocol Document procedures.

#### 2.1.3 Field QA/QC Results

Field quality assurance/quality control (QA/QC) samples were not collected or required at this site because the ten percent collection requirement for QA/QC duplicate samples has been met at other AFCEE bioventing test sites.

#### 2.2 Eglin Main Old Fire Training Area (FT-28)

#### 2.2.1 Soil and Soil Gas Sampling Results

Soils at the FT-28 site consist mainly of medium to coarse tan and dark yellowish brown to reddish brown sand. This soil profile included poorly to well graded sand with trace silt and trace gravel intermittently throughout the unsaturated zone to approximately 39 feet where groundwater was encountered.

Hydrocarbon contamination at the site appears to extend from the ground surface to the groundwater table. However, at depths between 15 to 30 feet evidence of contamination was minimal. Contaminated soils collected by split spoons during the VW and MP installations were identified based on visual appearance, odor and PID screening.

Varying degrees of hydrocarbon staining were encountered throughout the vertical profile in the unsaturated soil zone, and light to strong hydrocarbon odors were noticed in nearly all the split spoon samples. PID readings of greater than 20,000 ppm were measured in a number of soil samples.

Soil samples for laboratory analysis were collected in brass liners inserted into stainless steel split spoons during the VW and MP installations. Procedures for soil sample collection specified in the Protocol Document (Hinchee, et. al., 1992) were followed for all sample collections. Samples were collected from the 3 to 5 feet interval from the VW, from the 37 to 39 feet interval in MPA, and from the 2 to 4 feet interval in MPB. All split spoon samples were screened for VOCs by use of the PID to determine the presence of hydrocarbon contamination and to select samples for laboratory analysis.

Soil gas samples were collected prior to performing the air permeability test. These samples were collected in laboratory provided, evacuated Summa® canisters. Soil gas samples were collected from the VW, the 4.5 to 5 feet bgs discrete monitoring point at MPA, and from the 38.5 to 39 feet bgs discrete monitoring point in MPC. All soil gas samples were collected following procedures in the Protocol Document.

The soil samples for laboratory analysis were placed on ice and shipped via Federal Express® to the PACE Inc., Laboratory in Huntington Beach, CA. Each soil sample was analyzed for TRPH; BTEX; iron; alkalinity; TKN; pH; phosphates; percent moisture; and grain size distribution. Soil gas samples were placed in a shipping box (without ice), and shipped via Federal Express® to Air Toxics, Inc., in Folsom, CA for TVH and BTEX analysis. The results of the soils and soil gas samples are presented in Table 2.2.

#### 2.2.2 Exceptions to Test Protocol Document Procedures

No exceptions to the Test Protocol Document procedures were conducted during the initial pilot test at FT-28.

#### 2.2.3 Field QA/QC Results

Field quality assurance/quality control (QA/QC) samples included collection and analysis of duplicate samples for the media sampled. Consistent with requirements of the protocol the number of QA/QC samples was ten percent of the total number of samples collected for each medium. The results of the QA/QC samples are included in Appendices A, B and C.

#### 3.0 PILOT TEST RESULTS

#### 3.1 Hurlburt Field Fire Training Area (FT-39)

#### 3.1.1 Initial Soil Gas Chemistry

Prior to initiating any air injection, soil gas in the VW and all MPs were sampled for TVH, oxygen, and carbon dioxide. The VW and MPs were purged to remove stale soil gas prior to monitoring. Soil gas monitoring was accomplished using portable gas analyzers as described in the Protocol Document. The results of the initial monitoring is presented in Table 3.1.

As shown in Table 3.1, the VW and all MPs, with the exception of MPs at two shallow locations (MPA-3.5-4.0 and MPB-3.5-4.0), had completely depleted oxygen levels (0.0%), high carbon dioxide readings (greater than 7%), and TVH readings ranging from 16,000 parts per million (ppm) to greater than 20,000 ppm. These readings suggest that the indigenous microorganisms have completely depleted the naturally available oxygen supply, indicating significant biological activity. In contrast, the background monitoring point (EAFB2-1) indicated a high concentration of oxygen (approximately 13% oxygen) in the soil gas and less than 6% carbon dioxide. These measurements represent the subsurface condition at a depth of about 6 to 8 feet bgs (screen interval estimated above the water table in well EAFB2-1). TVH reading was estimated at 220 ppm.

#### 3.1.2 Air Permeability

An air permeability test was conducted according to the Protocol Document procedures on 18 March 1994. Air was injected into the VW for three hours at a rate of approximately 13 cubic feet per minute (cfm) and an average pressure of 40 inches of water. Steady-state pressure levels were achieved at all MPs in approximately 170 minutes. Table 3.2 provides the maximum steady-state pressures at each discrete monitoring point.

Due to the gradual response and relatively lengthy time to achieve steady-state conditions, the dynamic method of determining soil permeability was selected (Hinchee et al., 1992). Using the HyperVentilate® model, an air permeability value ranging from 14 to 150 darcys was calculated for this site. The air permeability, calculated using the steady-state method, was 6.8 darcys. The radius of pressure influence is estimated to exceed 60 feet for this site as presented in the models in Appendix D (note that pressure influence was observed at MPs located at 40 feet from the vent well at this site).

#### 3.1.3 Oxygen Influence

The depth and radius of oxygen influence in the subsurface resulting from air injection into the central VW is the primary design parameter for bioventing systems. Optimization of full-scale and multiple VW systems requires pilot testing to determine the volume of soil that can be oxygenated at a given flow rate and vent well screen configuration.

Table 3.3 presents the change in soil gas oxygen levels that occurred after approximately three days of continuous air injection. This period of air injection, at approximately 7 cfm (average), produced an increase in soil gas oxygen concentrations at least 40 feet from the VW. Based on the oxygen increase and the pressure response at the furthest monitoring point (MPC), the long-term radius of oxygen influence will exceed 40 feet when air is injected at a rate of approximately 7 cfm.

#### 3.1.4 In-Situ Respiration Rates

In-situ respiration tests were performed at the following monitoring points and depths: MPA (5.5 to 6 feet bgs), MPB (5.5 to 6 feet bgs), and MPC (3.0 to 3.5 feet bgs). These points were chosen based on their low oxygen readings (0.0%), high carbon dioxide readings (greater than 7%), and high TVH readings (greater than 20,000 ppm).

A 2-4 percent helium in air mixture was injected into each of the three discrete monitoring points for 17 hours during the initial part of the in-situ respiration test. Oxygen, carbon dioxide, and TVH concentrations were then measured in the soil gas at each discrete monitoring point. These readings were collected for approximately 72 hours following cessation of the helium/air injection period. The measured oxygen losses were then used to calculate biological oxygen utilization rates. The results of the in-situ respiration testing for the MPs are presented in Figures 3.1 through 3.3. Table 3.4 provides a summary of the oxygen utilization rates.

Because helium is a conservative, inert gas, the change in helium concentration over time can be useful in determining the effectiveness of the bentonite seals between each discrete monitoring point in the MPs. Figures 3.1 through 3.3 compare oxygen utilization and helium retention. Helium recovery was erratic and no conclusions regarding leakage or diffusion can be drawn from these data.

Oxygen loss was linear at every interval during the respiration test. Oxygen utilization rates observed at FT-39 were very consistent and ranged from 0.0026 to 0.0034% per minute (Table 3.4). Initial respiration test data is presented in Table 3.5.

At FT-39, an estimated 1,100 milligrams (mg) of fuel per kilogram of soil can be degraded each year. This value is the average of the fuel consumption rates calculated for every point at which a respiration test was conducted. The interval-specific fuel consumption rates were calculated using observed oxygen utilization rates, estimated air-filled porosites, and a conservative ratio of 3.5 mg of oxygen consumed for every 1 mg of fuel biodegraded. The air-filled porosity calculated for each sampling point ranged from 0.17 to 0.18 liters of air per kilogram of soil.

#### 3.1.5 Potential Air Emissions

The long-term potential for air emissions from full-scale bioventing operations at FT-39 are considered to be low because of the age and type of the site contaminants (greater than five years, and primarily JP4 jet fuel). Additionally, health and safety monitoring conducted during the permeability test using a PID sensitive to 1 ppm barely exceeded background levels. Because the potential for air emissions is highest during the initial air injection period, and very little emissions were detected, the long-term emission potential is considered low. Finally, the site is very isolated at the Hurlburt field, and is several hundred feet from any permanently occupied building.

#### 3.2 Eglin Main Old Fire Training Area (FT-28)

#### 3.2.1 Initial Soil Gas Chemistry

Prior to initiating any air injection, soil gas in the VW and all MPs were sampled for TVH, oxygen, and carbon dioxide. The VW and MPs were purged to remove stale soil gas prior to monitoring. Soil gas monitoring was accomplished using portable gas analyzers as described in the Protocol Document. The results of the initial monitoring is presented in Table 3.6.

As shown in Table 3.6, the VW and all MPs had completely depleted oxygen levels (0.0%), high carbon dioxide readings (greater than 10%), and TVH readings exceeding

20,000 ppm. These readings suggest that the indigenous microorganisms have completely depleted the naturally available oxygen supply, indicating significant biological activity. In contrast, the background monitoring point (EAFB1-1) indicated near atmospheric conditions in the soil gas (i.e. greater than 20% oxygen and less than 0.5% carbon dioxide) to a depth of at least 35 feet bgs.

#### 3.2.2 Air Permeability

An air permeability test was conducted according to the Protocol Document procedures on 23 March 1994. Air was injected into the VW for two and one-half hours at a rate of approximately 92 cubic feet per minute (cfm) and an average pressure of four inches of water. Steady-state pressure levels were achieved at all MPs in less than approximately 150 minutes. Table 3.7 provides the maximum steady-state pressures at each discrete monitoring point.

Due to the gradual response and relatively lengthy time to achieve steady-state conditions, the dynamic method of determining soil permeability was selected (Hinchee et al., 1992). Using the HyperVentilate® model, an air permeability value ranging from 77 to 305 darcys was calculated for this site. The air permeability, calculated using the steady-state method, was 70.4 darcys. The radius of pressure influence is estimated to exceed 60 feet for this site as presented in the models in Appendix D (note that pressure influence was observed at MPs located at 40 feet from the vent well at this site).

#### 3.2.3 Oxygen Influence

The depth and radius of oxygen influence in the subsurface resulting from air injection into the central VW is the primary design parameter for bioventing systems. Optimization of full-scale and multiple VW systems requires pilot testing to determine the volume of soil that can be oxygenated at a given flow rate and vent well screen configuration.

Table 3.8 presents the change in soil gas oxygen levels that occurred after 17 hours of continuous air injection. This period of air injection, at approximately 92 cfm, produced an increase in soil gas oxygen concentrations at least 40 feet from the VW. Based on the oxygen increase and the pressure response at the furthest monitoring point (MPC), the long-term radius of oxygen influence will exceed 40 feet when air is injected at a rate of approximately 92 cfm.

#### 3.2.4 In-Situ Respiration Rates

In-situ respiration tests were performed at the following monitoring points and depths: MPA (4.5 to 5 feet bgs), MPB (25.5 to 26 feet bgs), and MPC (38.5 to 39 feet bgs). These points were chosen based on their low oxygen readings (0.0%), high carbon dioxide readings (greater than 10%), and high TVH readings (greater than 20,000 ppm). A 2-4 percent helium in air mixture was injected into each of the three discrete monitoring points of MPA for 27 hours during the initial part of the in-situ respiration test. Oxygen, carbon dioxide, and TVH concentrations were then measured in the soil gas at each discrete monitoring point. These readings were collected for approximately 74 hours following cessation of the helium/air injection period. The measured oxygen losses were then used to calculate biological oxygen utilization rates. The results of the

in-situ respiration testing for the points are presented in Figures 3.4 through 3.6. Table 3.9 provides a summary of the oxygen utilization rates.

Because helium is a conservative, inert gas, the change in helium concentration over time can be useful in determining the effectiveness of the bentonite seals between each discrete monitoring point in the MPs. Figures 3.4 through 3.6 compare oxygen utilization and helium retention. Helium recovery was erratic and no conclusions regarding leakage or diffusion can be drawn from these data.

Oxygen loss was linear at every interval during the respiration test. Oxygen utilization rates observed at FT-28 were very consistent and ranged from 0.001 to 0.004% per min (Table 3.9). Initial respiration test data is presented in Table 3.10.

At FT-28, an estimated 860 mg of fuel per kilogram of soil can be degraded each year. This value is the average of the fuel consumption rates calculated for every point at which a respiration test was conducted. The interval-specific fuel consumption rates were calculated using observed oxygen utilization rates, estimated air-filled porosites, and a conservative ratio of 3.5 mg of oxygen consumed for every 1 mg of fuel biodegraded. The air-filled porosity calculated for each sampling point ranged from 0.09 to 0.17 liters of air per kilogram of soil.

#### 3.2.5 Potential Air Emissions

The long-term potential for air emissions from full-scale bioventing operations at FT-28 are considered to be low because of the age and type of the site contaminants (greater than ten years, and primarily JP4 jet fuel). The site history and contaminants at FT-39 are very similar to FT-28. Health and safety monitoring conducted during the permeability test using a PID sensitive to 1 ppm did not detect any hydrocarbons above background levels in the breathing zone or at the ground surface. Because the potential for air emissions is highest during the initial air injection period, and no emissions were detected, the long-term emission potential is considered low. The site is very isolated on Eglin AFB, and is several thousand feet from any permanently occupied building.

#### 4.0 RECOMMENDATIONS

Initial bioventing test at FT-39 and FT-28 indicate that naturally occurring oxygen has been depleted in the contaminated soils, and that air injection will be an effective method of increasing aerobic fuel biodegradation. AFCEE has recommended that air injection begin at both sites to determine the long-term radius of oxygen influence and the effects of time, available nutrients and changing temperatures on fuel biodegradation rates.

A one horsepower regenerative blower has been installed at FT-39 and at FT-28 to inject air at a rate of up to 8 cfm at FT-39 and 88 cfm at FT-28. This size blower was installed to allow for expansion of the bioventing system to include multiple air injection vent wells to impact an even larger area if necessary in the future. Extended (one-year) testing began at Hurlburt Field Site FT-39 on March 20, 1994. Due to a delay in power installation the extended test at Eglin Site FT-28 did not begin until July 6, 1994. ES will return to the base at six months and one year to analyze the soil gas and conduct

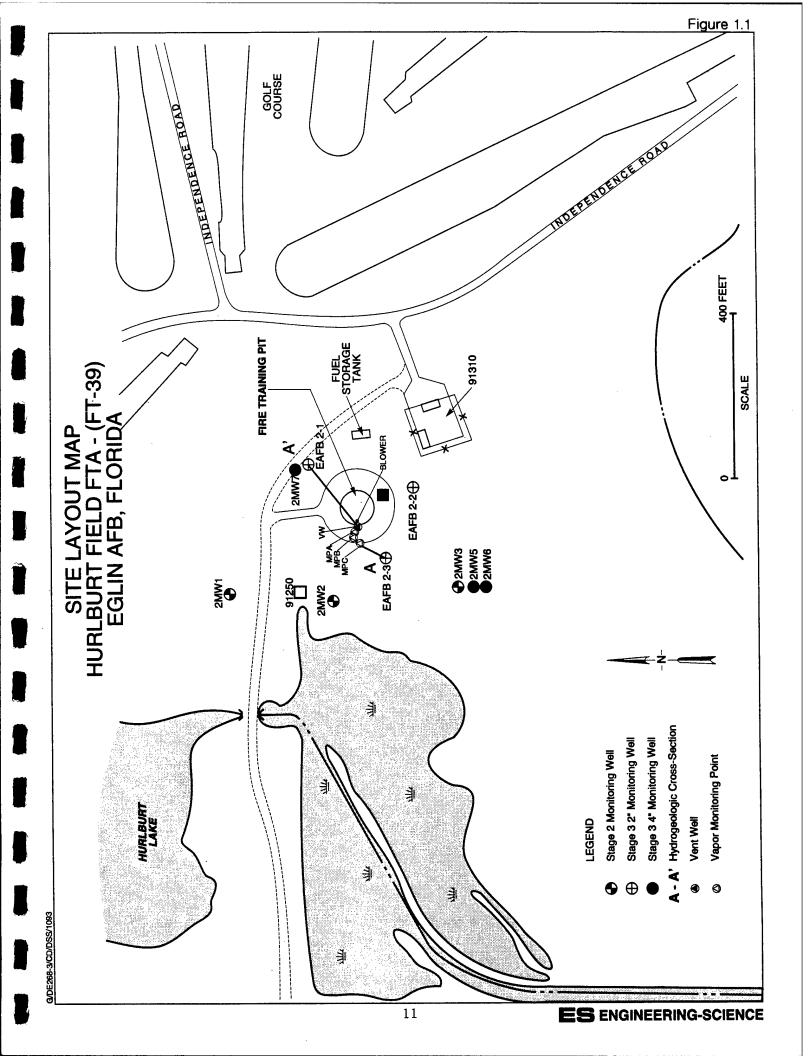
follow-up in-situ respiration tests. Additionally, at the one year point, ES will collect soil samples from both sites to determine the soil contamination levels after one year of in-situ treatment.

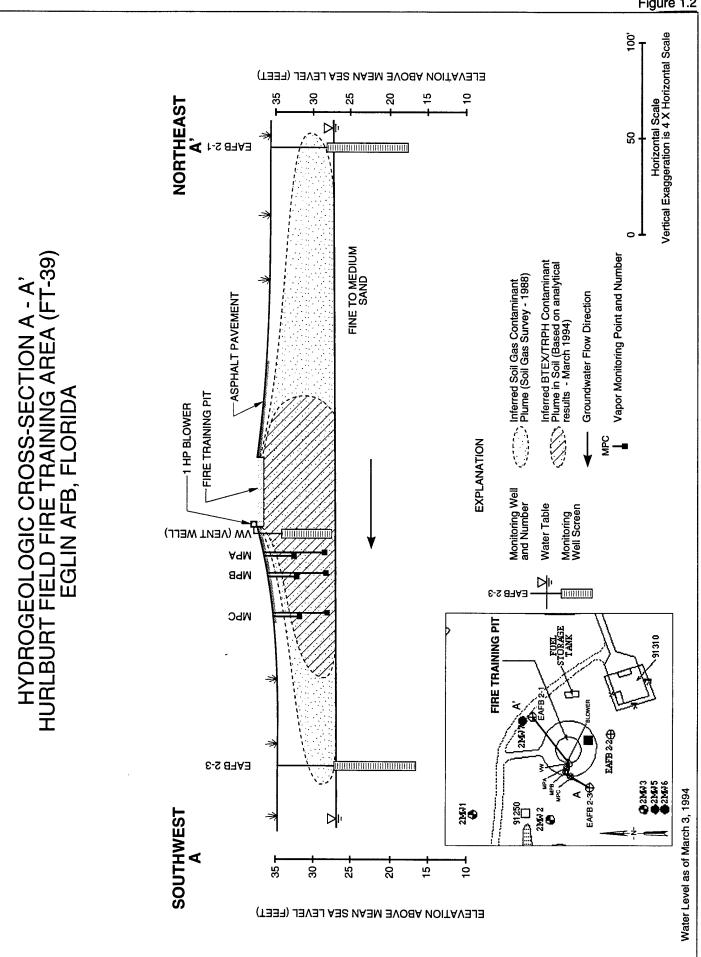
Based on the results of the first year of pilot-scale bioventing, AFCEE will recommend one of three options for these sites:

- 1. Upgrade, if necessary, and continue operation of the bioventing systems.
- 2. If the one year soil samples indicate that significant contamination removal has occurred, AFCEE may recommend additional soil sampling to confirm that the cleanup criteria has been achieved.
- 3. If significant difficulties or poor results are encountered during the bioventing pilot test, AFCEE may recommend removal of the blower system and proper abandonment of the VW and MPs.

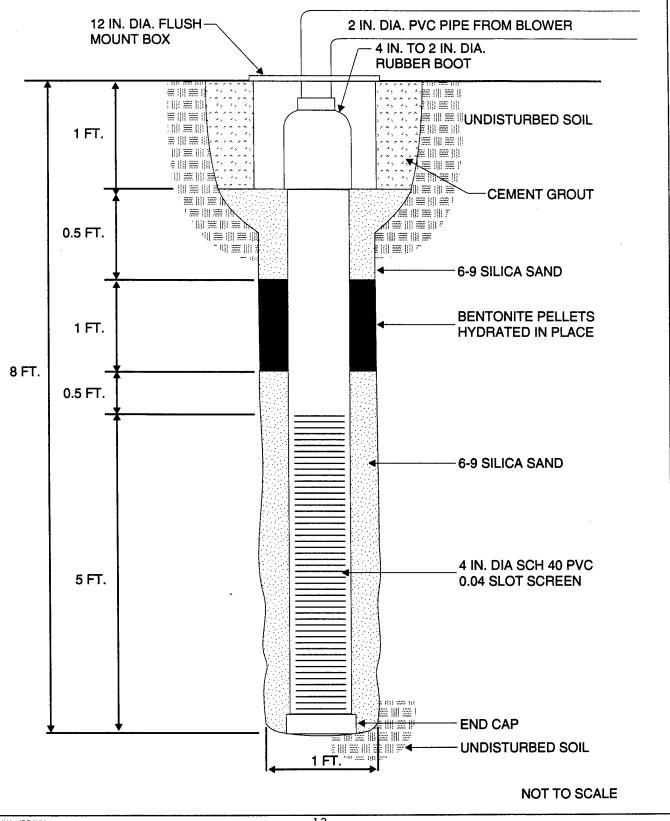
#### 5.0 REFERENCES

- Engineering-Science, Inc. 1993. Draft Bioventing Test Work Plan for A-20 Radar (SS-01) Hurlburt Field Fire Training Area (Site FT-39), Eglin Main Old Fire Training Area (FT-28). December.
- Hinchee, R.E., Ong, S.K., Miller, R.N., Downey, D.C., Frandt, R. 1992. Test Plan and Technical Protocol for a Field Treatability Test for Bioventing. Columbus, Ohio. January.

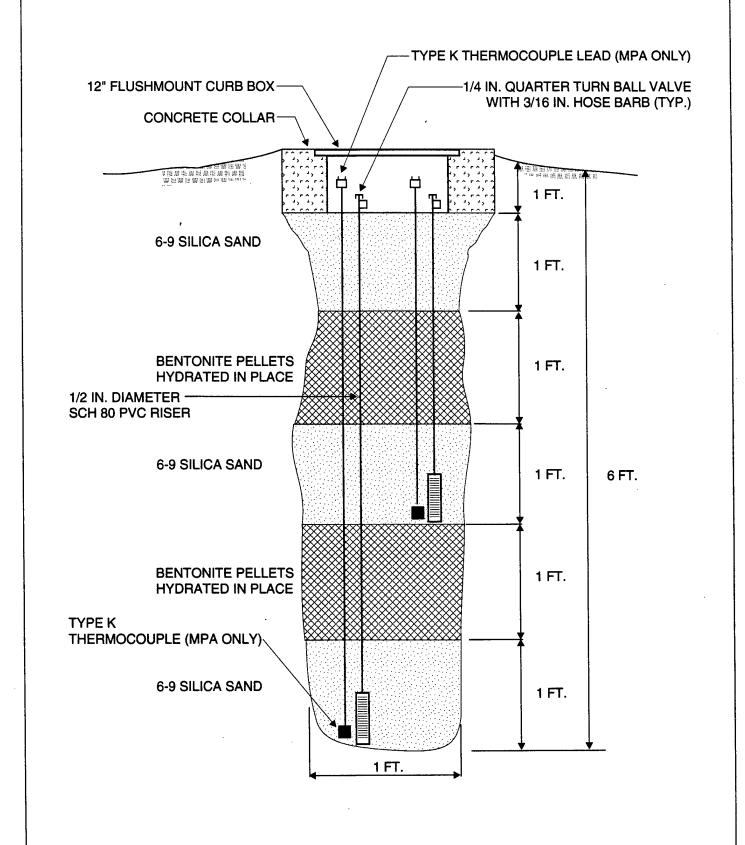




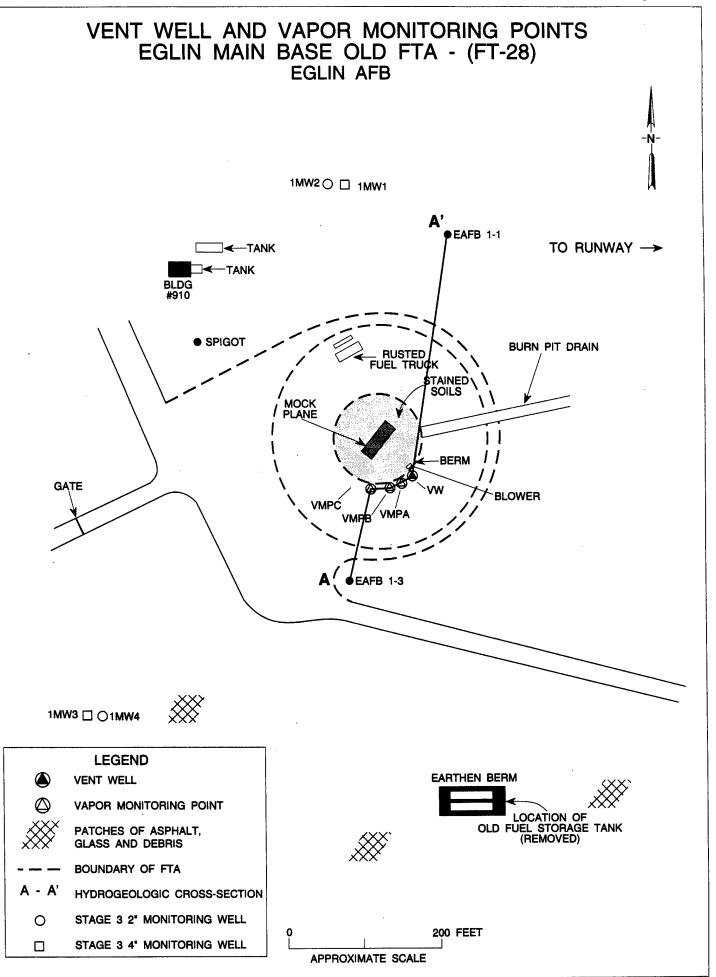
## INJECTION VENT WELL CONSTRUCTION DETAIL HURLBURT FIELD FTA - (FT - 39) EGLIN AFB, FLORIDA



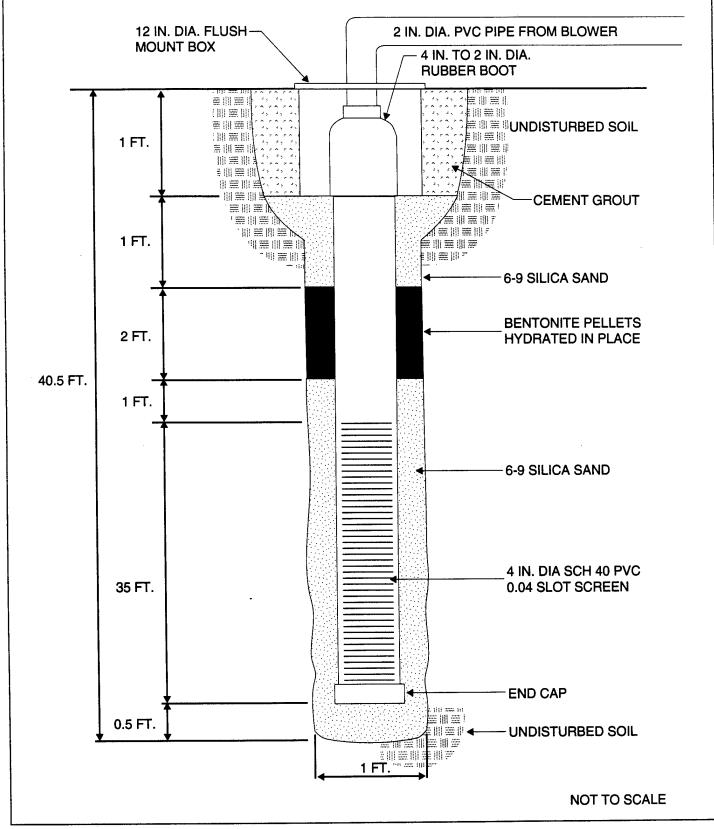
### TYPICAL MONITORING POINT HURLBURT FIELD FTA - (FT-39) EGLIN AFB, FLORIDA



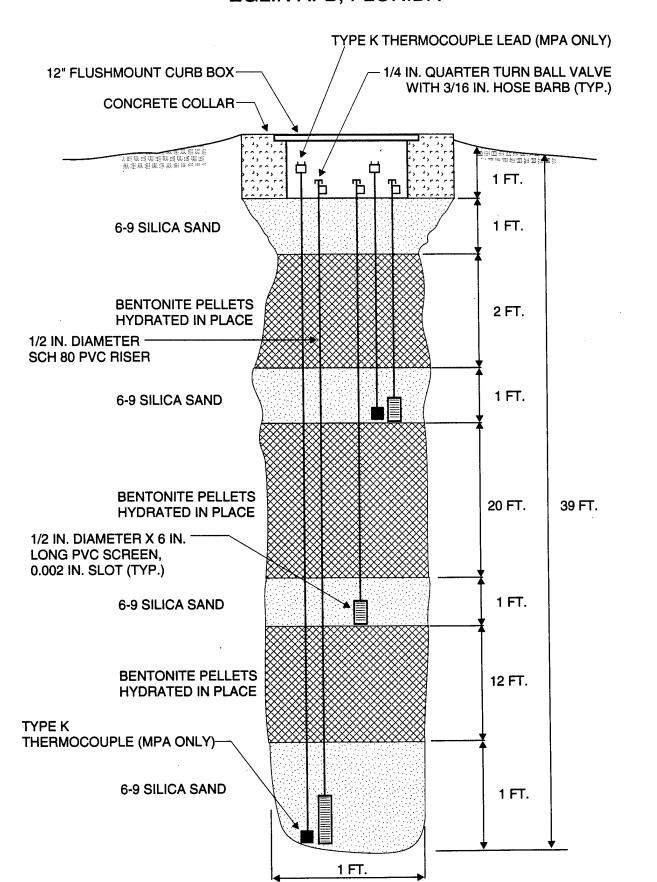
## FROM ATMOSPHERE (3) (c) SCHEMATIC OF BLOWER SYSTEM 4 EGLIN AFB, FLORIDA FOR AIR INJECTION (6) AUTOMATIC PRESSURE RELIEF VALVE - SET @ 42 INCHES H,O (9) MANUAL PRESSURE RELIEF (BLEED) VALVE - 1 1/2" BALL DRIVE MOTOR 1 HP / 3450 RPM @ 60 Hz / 230v / SINGLE PHASE / 15 A BLOWER - GAST R4110-2 / REGENERATIVE 70 SCFM @ 20 INCHES H<sub>2</sub>O AIR VELOCITY MEASUREMENT PORT PRESSURE GAUGE (INCHES OF H<sub>2</sub>O) (2) VACUUM GAUGE (INCHES OF H<sub>2</sub>O) THERMOMETER (FARENHEIT) POWER SWITCH (1) INLET FILTER **©** (b) (b) 4 VENT WELL (INJECTION)



# INJECTION VENT WELL CONSTRUCTION DETAIL EGLIN MAIN BASE OLD FTA - (FT - 28) EGLIN AFB, FLORIDA



## TYPICAL MONITORING POINT EGLIN MAIN BASE OLD FTA - (SITE FT-28) EGLIN AFB, FLORIDA



k = 0.0029 %/min (oxygen utilization Percent Oxygen Percent Helium rate) Percent Helium 2.5 2.0 1.5 1.0 0.5 0.0 3.5 Time (minutes x 1000) 1.5 0.5 0 25.0 opPercent Oxygen 15.0 0.0 5.0 20.0

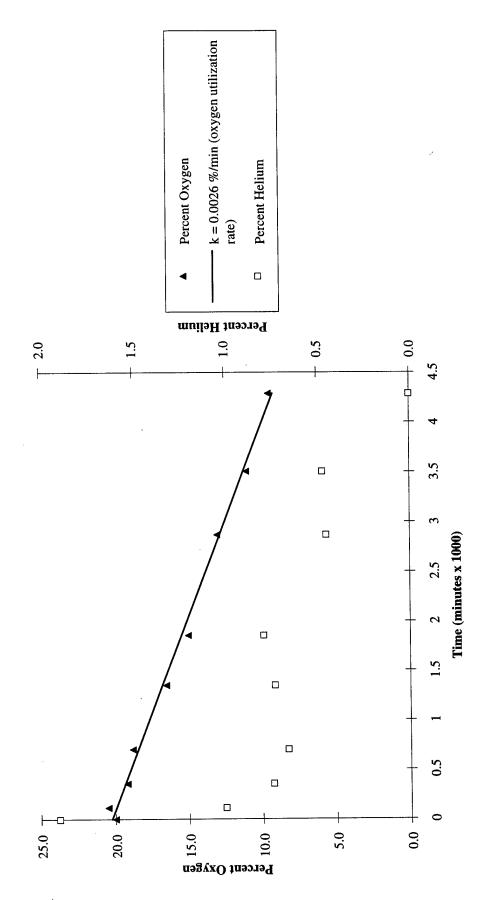
H:\722409\9311J102\MPADEEP.XLS Chart 1

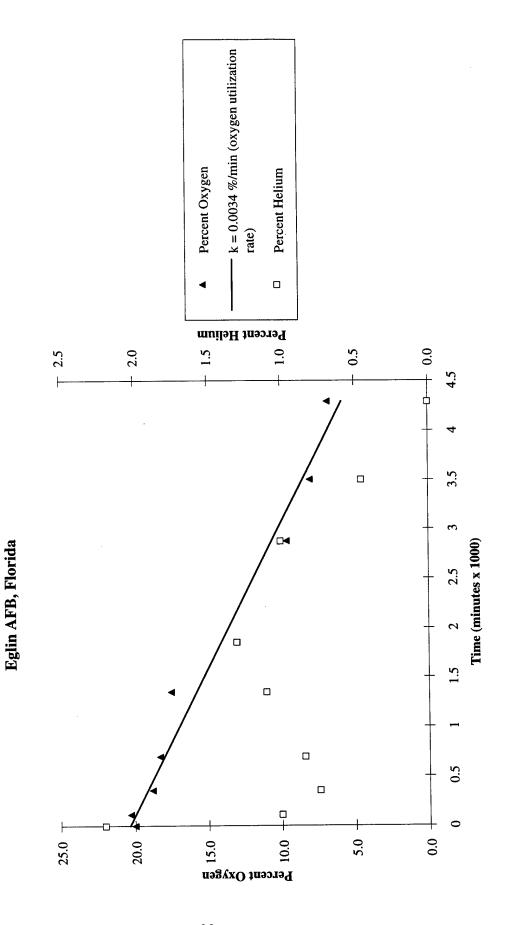
Oxygen and Helium Concentrations Hurlburt FTA, MPA-Deep

Eglin AFB, Florida

Initial Respiration Test

Initial Respiration Test
Oxygen and Helium Concentrations
Hurlburt FTA, MPB-Deep
Eglin AFB, Florida



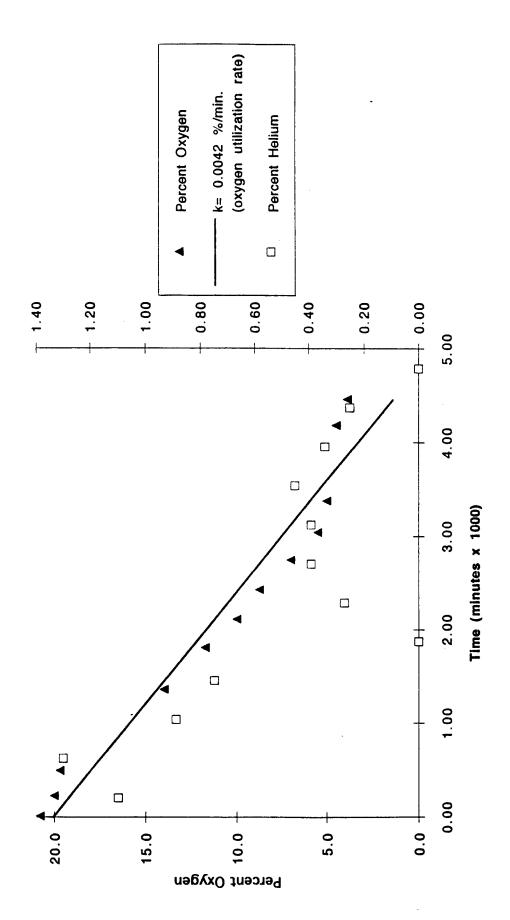


H:\722409\9311J102\MPCSHALL.XLS Chart 1

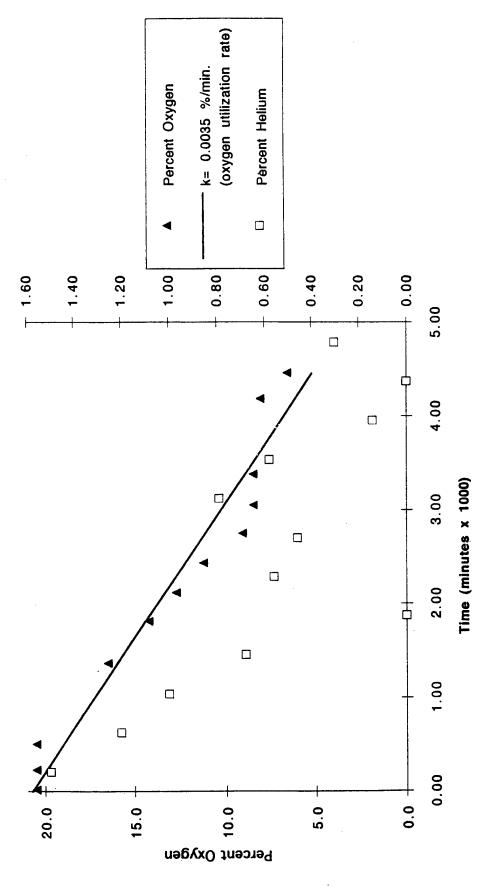
Oxygen and Helium Concentrations Hurlburt FTA, MPC-Shallow

Initial Respiration Test

Initial Respiration Test
Oxygen and Helium Concentrations
Eglin FTA (EG2), MPA-Shallow
Eglin AFB, Florida



Initial Respiration Test
Oxygen and Helium Concentrations
Eglin FTA (EG2), MPB-Medium
Eglin AFB, Florida



Initial Respiration Test
Oxygen and Helium Concentrations
Eglin FTA (EG2), MPC-Deep
Eglin AFB, Florida

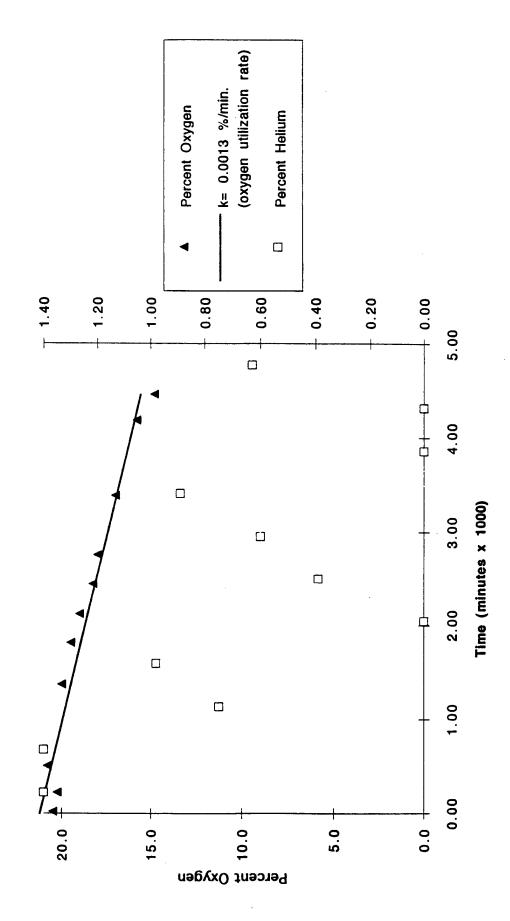


TABLE 2.1
SOIL AND SOIL GAS LABORATORY ANALYTICAL RESULTS
Fire Training Pit 1 - Hurlburt Field Fire Training Area (FT-39)
Eglin AFB, Florida

		Sample Location - 1	
Analyte (Units)a	(f	eet below ground s	urface)
Soil Gas Hydrocarbons	EG3-VW	EG3-MPA-3.5-4'	EG3-MPC-3.0-3.5'
TPH (ppmv)	14000	13000	26000
Benzene (ppmv)	32	24	53
Toluene (ppmv)	20	19	100
Ethylbenzene (ppmv)	8.5	6.8	21
Xylenes (ppmv)	35	30	170
Soil Hydrocarbons	EG3-VW-6-8'	EG3-MPA-3-5'	EG3-MPB-5'
TRPH (mg/kg)	15,800	12,100	848
Benzene (mg/kg)	ND(0.54)	ND(2.6)	ND(2.7)
Toluene (mg/kg)	15	22.	5.1
Ethylbenzene (mg/kg)	3.3	14	4.5
Xylenes (mg/kg)	26	88	29
Soil Inorganics			
Iron (mg/kg)	240	620	1,160
Alkalinity (mg/kg as CaCO3)	331	253	321
pH (units)	8.1	8.3	8.2
TKN (mg/kg)	ND (40)	120	83
Phosphates (mg/kg)	35	18	46
Soil Physical Parameters			
Moisture (% wt.)	6.9	5.8	7.1
Gravel (%)	0	0	0
Sand (%)	95.5	88.3	90
Silt (%)	1.9	6.5	4.8
Clay (%)	2.6	5.2	5.2
Soil Temperature	EG3-MPA-3.5-4	<u>1'</u>	EG3-MPA-5.5-6
-	63°F		63.4°F

a - TRPH = total recoverable petroleum hydrocarbons; TPH = total petroleum hydrocarbons; mg/kg - milligrams per kilogram; ppmv = parts per million by volume; CaCO3 = carbonate; TKN = total kjeldhal nitrogen.

ND - Not detected.

NS - Not sampled.

# TABLE 2.2 SOIL AND SOIL GAS LABORATORY ANALYTICAL RESULTS Eglin Main Old Fire Training Area (FT-28) Eglin AFB, Florida

		Sample Location - I	Depth
Analyte (Units)a	<u>(f</u>	eet below ground s	urface)
Soil Gas Hydrocarbons	EG2-VW	EG2-MPA-4.5-5'	EG2-MPC-38.5-39'
TPH (ppmv)	11,000	11,000	26,000
Benzene (ppmv)	94	93	250
Toluene (ppmv)	52	24	460
Ethylbenzene (ppmv)	20	20	47
Xylenes (ppmv)	76	64	220
Soil Hydrocarbons	EG2-VW-3-5'	EG2-MPA-37-39'	EG2-MPB-2-4'
TRPH (mg/kg)	2,210	3,370	6,610
Benzene (mg/kg)	10	0.15	ND (2.7)
Toluene (mg/kg)	21	0.19	ND (2.7)
Ethylbenzene (mg/kg)	24	0.4	9.9
Xylenes (mg/kg)	72	2.5	22
Soil Inorganics			
Iron (mg/kg)	2,560	135	2,100
Alkalinity (mg/kg as CaCO3)	354	ND (42)	128
pH (units)	8.2	6.6	7.8
TKN (mg/kg dry weight)	ND (43)	ND (43)	ND (43)
Phosphorus (mg/kg dry weight)	28	29	15
Soil Physical Parameters			
Moisture (% wt.)	6	7	7.6
Gravel (%)	0.1	0	0
Sand (%)	91.8	92.5	92.2
Silt (%)	2.1	4.0	1.8
Clay (%)	6	3.5	6.1
Soil Temperature	EG2-MPA-4.5-5	<u>5'</u>	EG2-MPA-38.5-39
	58.7°F		70.3°F

a - TRPH = total recoverable petroleum hydrocarbons; TPH = total petroleum hydrocarbons; mg/kg - milligrams per kilogram; ppmv = parts per million by volume; CaCO3 = carbonate; TKN = total kjeldhal nitrogen.

ND - Not detected- Detection limit in parenthesis.

NS - Not sampled.

TABLE 3.1
INITIAL SOIL GAS CHEMISTRY
Hurlburt Fire Training Area (FT-39)
Eglin AFB, Florida

MP Depth	O2	CO2	TVH
(ft)	(%)	(%)	(ppm)
EG3-VW-3-8	0.0	9	20,000+
EG3-MPA-3.5-4.0	1.2	7	20,000+
EG3-MPA-5.5-6.0	0.0	8.5	20,000+
EG3-MPB-3.5-4.0	3.5	5.25	16,000
EG3-MPB-5.5-6.0	0.0	7.5	20,000+
EG3-MPC-3.0-3.5	0.0	9	20,000+
EG3-MPC-5.0-5.5	0.0	9	20,000+

TABLE 3.2
MAXIMUM PRESSURE RESPONSE
AIR PERMEABILITY TEST
Hurlburt Fire Training Area (FT-39)
Eglin AFB, Florida

		Distance from	n injection we	ll (EG3-VW)		
		10' ИРА)	,	20' ИРВ)		10' 1PC)
Depth (feet)	3.5-4.0	5.5-6.0	3.5-4.0	5.5-6.0	3.0-3.5	5.0-5.5
Time (minutes)	170	170	170	170	170	170
Max Pressure (inches H2O)	11.6	12.2	5.98	7.45	3.09	3.2

# TABLE 3.3 INFLUENCE OF AIR INJECTION AT VENT WELL ON MONITORING POINT OXYGEN LEVELS Hurlburt Fire Training Area (FT-39) Eglin AFB, Florida

MP	Distance from VW (ft)	Screen Depth (ft)	Initial O2 (%)	Final O2 (%) End of Permeability Test	O2 After 3 Days of Injection
EG3-MPA-Shallow	10	3.5-4.0	1.2	19.0	20.0
EG3-MPA-Deep	10	5.5-6.0	0	20.4	20.0
EG3-MPB-Shallow	20	3.5-4.0	3.5	20.0	20.5
EG3-MPB-Deep	20	5.5-6.0	0	20.0	20.9
EG3-MPC-Shallow	40	3.0-3.5		0.0	19.4
EG3-MPC-Deep	40	5.0-5.5		0.0	20.0

# TABLE 3.4 SUMMARY OF OXYGEN UTILIZATION RATES Hurlburt Fire Training Area (FT-39) Eglin AFB, Florida

	Oxygen
Monitoring Point	Utilization Rate (%/minute)
EG3-MPA-5.5-6.0	0.0029
EG3-MPB-5.5-6.0	0.0026
EG3-MPC-3.0-3.5	0.0034

## TABLE 3.5 Initial Respiration Test Huriburt FTA Eglin AFB, Fiorida

Carte   Daye   Hre slapeed   Daye   Time   Hydro-Hydro-Hydro-Hydro-Date   Grace   Grace   Grace   Grace   Grace   Hydro-Date   Grace   Grace				_			Elapsed								
Comments   Comments			Days		Hrs elapsed	Days	Time			Total					
Date         (frac. daye)         Time         daye         1000)         02%         G22%         carbon         Helium         Commente           03/15/34         0.00         10:00         0.00         20:	Monitoring		Elapsed		(fractional	Elapsed	(mln. x			Hydro.			Trend of 02	30%	
03/15/94   0 to   10:00   0 to   0	Point	Date	(frac. day	e) Time	daye)		1000)	02%	C02%	carbon	Helium	Comments	TIMe	x-values	×
03/15/94   0 to   12:00   0 08   0 08   0 12   20 0   0 30   290   14 0   0 0 0   18:00   0 25   0 25   0 36   19:00   0 50	MPA-Deep	03/15/94	0.0	0 10:00			00.0	20.3	0.20	110	2.40		20.101453	0	0.002922
03/15/94         0 00 16:00         0 25         0 25         0 36         190         0 50         500         0 96 Temperature = 62.8 degrees           03/15/94         1 00 0 21:40         0 43         0 43         0 43         0 75         182         0 50         1 000         0 69           03/15/94         1 00 0 21:40         0 0 6         1 29         1 29         1 86         1 45         0 60         0 70         Temperature = 63 degrees           03/15/94         1 00 16:50         0 29         1 29         1 28         1 10         0 63         0 70         Temperature = 63 degrees           03/17/94         2 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	MPA-Deep	03/15/94		0 12:00			0.12	20.0	0.30	290	1.40		7.5656199	4.29	
03/15/94         0 00         21:40         0 49         0 49         0 70         182         0 50         760         0 68           03/15/94         1 00         08:30         -0.06         0.94         1.35         16.0         0 60         1,000         0.70         Femporature = 63.4 degrees           03/17/94         2 00         06:55         -0.01         1.29         2.87         11.0         1.20         0.70         0.70           03/17/94         2 00         06:56         -0.01         1.29         2.87         11.0         1.20         0.70         0.70           03/16/94         2 00         06:50         -0.02         2.43         3.51         9.8         1.50         1.400         0.73           03/16/94         0.00         10:22         0.02         0.02         0.02         0.02         0.02         0.00         0.0	MPA-Deep	03/15/94		0 16:00			0.36	19.0		500	96.0	Temperature = 62.8 degrees			
03/16/94         1 00         08:30         .0 06         0 94         1 35         16 0         0 60         1,000         0 70         Temperature = 63 4 degrees           03/16/94         1 00         16:55         0.29         1.29         1 86         14.5         0.80         1,100         0.79           03/17/94         2 00         155         0.40         1.99         2.87         1.60         1,400         0.05           03/17/94         2 00         1.20         0.42         2.87         1.60         0.05         0.00	MPA-Deep	03/15/94		0 21:40			0.70	18.2		780	0.69				
03/15/94         1 00 16:55         0.29         1 29         1 86         14.5         0.80         1,100           03/17/94         2 00 09:50         -0.01         1 99         2.87         11.0         1.25         1,100           03/17/94         2 00 20:25         -0.02         2 98         1.60         1.200           03/15/94         3 00 09:25         -0.02         2 98         4 29         8 3         1.60         1,400           03/15/94         0 00 10:02         0.00         0.00         0.00         0.00         0.00         0.00         2.00         0.00 <td< td=""><td>MPA-Deep</td><td>03/16/94</td><td></td><td>0 08:30</td><td></td><td>0</td><td>1.35</td><td>16.0</td><td></td><td>1,000</td><td>0.70</td><td>Temperature = 63.4 degrees</td><td></td><td></td><td></td></td<>	MPA-Deep	03/16/94		0 08:30		0	1.35	16.0		1,000	0.70	Temperature = 63.4 degrees			
03/17/94         2 00         08:50         -0.01         1.99         2.87         11.0         1.25         1,100           03/17/94         2 00         20:25         0.43         2.43         3.51         9.6         1.50         1,200           03/15/94         3 00         09:25         -0.02         2.98         4.29         8.3         1.60         1,400           03/15/94         0 00         10:02         0.00         0.00         0.00         2.0         0.20         3.2           03/15/94         0 00         11:57         0.00         0.00         0.00         2.0         0.20         4.8           03/15/94         0 00         11:57         0.05         0.25         0.25         0.25         0.26         0.36         0.36         0.36         0.36         0.36         0.36         0.36         0.30         0.36 <td>MPA-Deep</td> <td>03/16/94</td> <td></td> <td>0 16:55</td> <td></td> <td>-</td> <td>1.86</td> <td>14.5</td> <td>0.80</td> <td>1,100</td> <td>0.79</td> <td></td> <td></td> <td></td> <td></td>	MPA-Deep	03/16/94		0 16:55		-	1.86	14.5	0.80	1,100	0.79				
03/15/94         2 00         20:25         0.43         2.43         3.51         9 8         1.50         1,200           03/18/94         3 00         09:25         -0.02         2.99         4.29         8 3         1.60         1,400           03/15/94         0 00         10:02         0.00         0.00         0.00         20         2.20         0.20         3.2           03/15/94         0 00         11:57         0.08         0.08         0.12         20:5         0.20         4.8           03/15/94         0 00         11:57         0.08         0.08         0.12         20:5         0.20         4.8           03/15/94         1 00         16:00         0.02         0.04         0.04         0.04         0.05         0.05         0.05         0.05         0.05         0.05         0.05         0.05         0.05         0.05         0.05         0.05         0.05         0.05         0.05         0.05         0.05         0.05         0.05         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00	MPA-Deep	96/11/60		08:50		_	2.87	11.0	1.25	1,100	0.63				
03/15/94         3 00         09:25         -0.02         2 98         4.29         8 3         1.60         1,400           03/15/94         0 00         10:02         0 00         0 00         0 00         20         0 20         32           03/15/94         0 00         11:57         0 08         0 0.25         0 .36         19 2         0 .50         160           03/15/94         0 00         16:00         0 .25         0 .25         0 .36         19 2         0 .50         160           03/15/94         1 0 0         0 .32         -0.55         0 .25         0 .36         10 .60         280         160         280           03/17/94         2 0 0         0 .26         0 .26         1 .20         2 .88         15.0         10.00         280           03/17/94         2 0 0         0 .26         0 .26         2 .88         1 .86         1 .50         1 .00           03/18/94         2 0 0         0 .26         0 .44         2 .44         3 .51         1 .00         7 .00           03/15/94         0 .00         1 .00         0 .00         0 .00         0 .00         0 .00         0 .00           03/15/94         0 .00	MPA-Deep	03/17/94		0 20:25		2.43	3.51		1.50	1,200	0.15				
03/15/94         0 000         10:02         0 00         0 00         20         0 0.20         32           03/15/94         0 000         11:57         0 08         0 0.00         0 0.00         0 0.00         48           03/15/94         0 000         16:00         0 25         0 25         0 .26         0 .20         48           03/15/94         0 000         21:46         0 .49         0 .71         18         0 .50         160           03/15/94         1 0 0         08:32         -0.25         0 .29         1 .86         1 .65         0 .70           03/17/94         2 0 0         06:55         0 .26         0 .20         2.88         13.0         1.00           03/17/94         2 0 0         06:56         0 .26         1 .86         1.50         340           03/17/94         2 0 0         06:56         0 .26         2.44         3.51         11.0         1.50           03/17/94         2 0 0         06:30         -3.02         2.98         4.29         9.5         1.50         1.00           03/16/94         0.00         10:05         0.05         0.05         0.05         0.05         0.00         0.00	MPA-Deep	03/18/94		0 09:25		2.98	4.29		1.60	1,400	0 0				
03/15/94         0.00         10:02         0.00         0.00         0.00         20         0.20         48           03/15/94         0.00         11:57         0.08         0.08         0.12         20:5         0.20         48           03/15/94         0.00         16:00         0.25         0.25         0.36         19:2         0.50         160           03/15/94         0.00         21:46         0.49         0.71         18:8         0.60         280           03/16/94         1.00         16:56         0.26         1.29         1.86         15:0         0.70         280           03/17/94         2.00         09:55         0.26         1.29         1.86         15:0         0.80         640           03/17/94         2.00         09:56         0.26         2.02         2.03         2.04         2.44         3.51         11:0         1.50         3.00           03/15/94         0.00         10:05         0.06         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00															
03/15/94         0.00         11:57         0.08         0.012         20.5         0.20         48           03/15/94         0.00         16:00         0.25         0.25         0.36         19:2         0.50         160           03/15/94         0.00         21:46         0.05         0.49         0.71         18:8         0.60         280           03/16/94         1:00         06:32         0.05         0.29         1.35         16:5         0.70         540           03/17/94         1:00         16:56         0.29         1.29         1.86         15:0         0.80         640           03/17/94         2:00         09:55         0.76         2.00         2.88         1.30         1.00         7.00           03/17/94         2:00         09:56         0.44         2.44         3.51         11.0         1.50         3.40           03/15/94         0.00         10:05         0.00 <td>MPB-Deep</td> <td>03/15/94</td> <td></td> <td>0 10:02</td> <td></td> <td></td> <td>00.0</td> <td>20.0</td> <td>0.20</td> <td>32</td> <td>1.90</td> <td></td> <td>20.252725</td> <td>0</td> <td>0.002577</td>	MPB-Deep	03/15/94		0 10:02			00.0	20.0	0.20	32	1.90		20.252725	0	0.002577
03/15/94         0 00         16:00         0.25         0.25         0.36         19:2         0.50         160           03/15/94         0 00         21:46         0.49         0.49         0.71         18:6         0.50         280           03/16/94         1 00         08:32         0.05         0.26         1.29         1.86         15:0         0.70         540           03/17/94         2 00         09:55         0.07         2.00         2.88         13:0         1.00         700           03/17/94         2 00         09:55         0.07         2.44         3.51         11:0         1.50         340           03/18/94         3.00         09:30         -3.02         2.98         4.29         9.5         1.50         1.000           03/15/94         0.00         10:05         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00           03/15/94         0.00         11:55         0.25         0.26         0.20         0.20         0.20         0.20         0.20         0.20         0.20         0.20         0.20         0.20         0.20         0.20         0.20         0.20 </td <td>MPB-Deep</td> <td>96/51/60</td> <td></td> <td>0 11:57</td> <td></td> <td></td> <td>0.12</td> <td>20.5</td> <td>0.20</td> <td>48</td> <td>1.00</td> <td></td> <td>9.1990212</td> <td>4.29</td> <td></td>	MPB-Deep	96/51/60		0 11:57			0.12	20.5	0.20	48	1.00		9.1990212	4.29	
03/15/94         0 00         21.46         0.49         0.49         0.71         186         0.60         280           03/16/94         1 00         08:32         -0.05         0.94         1.35         16.5         0.70         540           03/16/94         1 00         16:58         0.02         1.29         1.86         15.0         0.80         640           03/17/94         2 00         09:55         0.02         2.00         2.88         13.0         1.00         700           03/17/94         2 00         20:28         0.34         2.44         3.51         11.0         1.50         940           03/18/94         3.00         09:30         -3.02         2.98         4.29         9.5         1.50         1.000           00         03/15/94         0.00         10:05         0.00	MPB-Deep	03/15/84		0 16:00			0.36		0.50	160	0.74				
03/16/94         1 00         08:32         -0.05         0.94         1.35         16:5         0.70         540           03/16/94         1 00         16:58         0.29         1.29         1.86         15:0         0.80         640           03/17/94         2 00         20:28         0.04         2.44         3.51         11:0         1.50         340           03/17/94         2 00         20:28         0.44         2.44         3.51         11:0         1.50         340           03/15/94         3 00         09:30         -7.02         2.98         4.29         9.5         1.50         1.000           03/15/94         0 00         10:05         0.05         0.00         0.00         20:0         0.20         8.4           03/15/94         0 00         11:55         0.02         0.02         0.00         0.00         2.00         0.00         2.00           03/16/94         1 00         15:00         0.02         0.02         0.02         0.00         1.00         1.00           03/17/94         1 00         17:00         0.02         0.02         0.02         0.00         0.00         0.00         0.00         0.0	MPB-Deep	03/15/94		0 21:46			0.71		09.0	280	99.0				
03/16/94         1.00         16:58         0.29         1.29         1.66         15.0         0.80         640           03/17/94         2.00         09:55         0.00         2.00         2.88         13.0         1.00         7.00           03/17/94         2.00         20:28         0.44         2.44         3.51         11.0         1.50         9.40           03/18/94         3.00         09:30         -7.02         2.98         4.29         9.5         1.50         1.000           03/15/94         0.00         10:05         0.00         0.00         20.0         20.0         8.4           03/15/94         0.00         11:55         0.02         0.00         0.00         20.0         8.4           03/15/94         0.00         11:55         0.25         0.35         1.88         0.50         280           03/15/94         0.00         21:40         0.02         0.40         0.70         18.8         0.50         640           03/17/94         1.00         08:34         0.05         0.29         1.29         1.86         1.90         1.00           03/17/94         2.00         10:00         0.00         0.	MPB-Deep	03/16/94		0 08:32		0	1.35	16.5	0.70	540	0.73				
03/17/94         2.00         09:55         0.00         2.00         2.88         13.0         1.00         700           03/17/94         2.00         20:28         0.44         2.44         3.51         11.0         1.50         940           03/18/94         3.00         09:30         -7.02         2.98         4.29         9.5         1.50         1.000           03/15/94         0.00         10:05         0.00         0.00         20.0         20.0         84           03/15/94         0.00         11:55         0.23         0.08         0.12         20.3         0.40         22.0           03/15/94         0.00         21:40         0.05         0.25         0.36         18.8         0.50         28.0           03/15/94         1.00         0.8:34         -0.05         0.49         0.70         18.3         0.50         640           03/17/94         1.00         10:00         0.02         1.29         1.26         1.00         1.20           03/17/94         2.00         10:00         0.02         2.44         3.51         8.0         2.00           03/17/94         2.00         10:00         0.00         2	MPB-Deep	03/16/94		0 16:58		-	1.86	15.0	0.80	640	0.79				
03/17/94         2.00         20:28         0.44         2.44         3.51         11.0         1.50         940           03/18/94         3.00         09:30         -7.02         2.98         4.29         9.5         1.50         1.000           03/15/94         0.00         10:05         0.05         0.00         0.00         20.0         0.20         84           03/15/94         0.00         11:55         0.03         0.05         0.00         20.0         22.0           03/15/94         0.00         11:55         0.25         0.36         0.70         18.8         0.50         28.0           03/15/94         1.00         22:40         0.25         0.36         18.8         0.50         28.0           03/17/94         1.00         1.20         0.29         1.29         1.25         1.00         1.000           03/17/94         2.00         10:00         0.02         1.29         1.26         1.30         2.00           03/17/94         2.00         10:00         0.02         2.88         9.6         1.30         2.00           03/17/94         2.00         10:00         0.34         2.44         3.51         8	MPB-Deep	03/17/94		0 09:55		i	2.88	13.0	1.00	700	0.45				
03/15/94         3.00         09:30         -3.02         2.98         4.29         9.5         1.50         1,000           03/15/94         0.00         10:05         0.05         0.00         0.00         20         0.20         84           03/15/94         0.00         11:55         0.05         0.08         0.12         20:3         0.40         220           03/15/94         0.00         16:00         5.25         0.25         0.36         18         0.50         280           03/15/94         1.00         0.21:40         0.42         0.70         18:3         0.50         280           03/17/94         1.00         17:00         0.29         1.29         1.86         13:0         1,000           03/17/94         2.00         10:00         0.24         2.44         3.51         8.0         2.00           03/17/94         2.00         10:00         0.24         2.44         3.51         8.0         2.00           03/17/94         2.00         10:37         0.02         2.98         4.30         6.8         2.50         3.600	MPB-Deep	03/17/94		0 20:28		7		11.0	1.50	940	0.47				
03/15/94         0 00         10:05         0 00         0 00         20         0 00         20         84           03/15/94         0 00         11:55         0 00         0 00         0 00         20         0 00         20         0 00         20         0 00         20         0 00         20         0 00         20         0 00         20         0 00         20         0 00         20         0 00         20         0 00	MPB-Deep	03/18/94		08:30					1.50	1,000	00.0				
03/15/94         0 00 10:05         0 00         0 00         0 0															
03/15/94         0 00         11:55         C 23         0.08         0.12         20:3         0.40         220           03/15/94         0 00         16:00         5.25         0.25         0.36         18.8         0.50         280           03/15/94         0 00         21:40         0.42         0.49         0.70         18.3         0.50         540           03/16/94         1 00         08:34         -0.66         0.94         1.35         17.5         0.60         1,000           03/17/94         2 00         10:00         0.00         2 00         2.00         2.00         2.00         2.00           03/18/94         3 00         09:37         -0.02         2.94         4.30         6.8         2.50         3.50	MPC-Shallow	03/15/94				0.00	00.0	20.0	0.20	84	2.20		20.359211	0	0.003387
03/15/94         0 00         16:00         5.25         0.25         0.36         18:8         0.50         280           03/15/94         0 00         21:40         0.42         0.49         0.70         18:3         0.50         640           03/16/94         1 00         08:34         -0.65         0.94         1.35         17:5         0.60         1,000           03/16/94         1 00         17:00         0.29         1.29         1.86         13:0         1.200           03/17/94         2 00         10:00         0.00         2 00         2 88         9:6         1.90         2.00           03/17/94         2 00         20:30         0.44         2.44         3.51         8:0         2.10         3.50	MPC-Shallow	03/15/94		0 11:55			0.12	20.3	0.40	220	1.00		5.7940976	4.3	
03/15/94         0.00         21:40         C-40         0.49         0.70         18:3         0.50         640           03/16/94         1:00         08:34         -0.05         0.94         1:35         17:5         0.60         1,000           03/16/94         1:00         17:00         0.29         1:29         1:86         13:0         1:200           03/17/94         2:00         10:00         0.00         2:00         2:88         9:6         1:90         2:00           03/17/94         2:00         20:30         0.44         2:44         3:51         8:0         2:10         3:200           03/17/94         3:00         09:37         -0.02         2:98         4:30         6:8         2:50         3:600	MPC-Shallow	98/11/20		0 16:00			0.36	18.8	0.50	280	0.74				
03/16/94         1 00         08:34         -0.00         0 94         1 35         17.5         0.60         1,000           03/16/94         1 00         17:00         0.29         1.29         1 86         13.0         1.00         1,200           03/17/94         2 00         10:00         0.00         2 00         2 88         9.6         1.90         2.00           03/17/94         2 00         20:30         0.44         2.44         3.51         8.0         2.10         3.200           03/18/94         3 00         09:37         -0.02         2.98         4.30         6.8         2.50         3.600	MPC-Shallow	03/15/94		0 21:40		0	0.70	18.3	0.50	640	0.84				
03/16/94         1.00         17:00         0.29         1.29         1.86         13:0         1.00         1.200           03/17/94         2.00         10:00         0.00         2.00         2.88         9:6         1.90         2.00           03/17/94         2.00         20:30         0.44         2.44         3.51         8:0         2.10         3.200           03/18/94         3.00         09:37         -0.02         2.98         4.30         6:8         2.50         3.600	MPC-Shallow	03/16/94		0 08:34		0	1.35	17.5	0.60	1,000	1.10				
03/17/94         2.00         10:00         0.00         2.00         2.08         9.6         1.90         2.00           03/17/94         2.00         20:30         0.44         2.44         3.51         8.0         2.10         3.200           03/18/94         3.00         09:37         -0.02         2.98         4.30         6.8         2.50         3.600	MPCShallow	03/16/94		0 17:00		-	1.86	13.0	1.00	1,200	1.30				
03/17/94 2.00 20:30 0.44 2.44 3.51 8.0 2.10 3.200 03/18/94 3.00 09:37 .0 02 2.98 4.30 6.8 2.50 3.600	MPC-Shallow	03/17/94		0 10:00		2			1.90	2,000	1.00				
03/18/94 3 00 09 37 -0 02 2 98 4 30 6 8 2 50 3 600	MPC-Shallow	03/17/94		0 20:30			3.51		2.10	3,200	0.45				
	MPC-Shallow	03/18/94		0 09:37	-0.02	2.98	4.30	8.9	2.50	3,600	0.00				

TABLE 3.6 INITIAL SOIL GAS CHEMISTRY Eglin Main Old Fire Training Area (FT-28) Eglin AFB, Florida

MP Depth	O2	CO2	TVH
(ft)	(%)	(%)	(ppm)
EG2-VW-5-40	0.0	10.5	20,000+
EG2-MPA-4.5-5	0.0	10.25	20,000+
EG2-MPA-25.5-26	0.0	10.25	20,000+
EG2-MPA-38.5-39	NM	NM	NM
EG2-MPB-4-4.5	0.0	10.25	20,000+
EG2-MPB-25.5-26	0.0	10.25	20,000+
EG2-MPB-38-38.5	0.0	10.5	20,000+
		·	
EG2-MPC-4-4.5	0.0	10.75	20,000+
EG2-MPC-25.5-26	0.0	10.5	20,000+
EG2-MPC-38-38.5	0.0	11	20,000+

NM-Not Measured (unable to draw sample)

TABLE 3.7
MAXIMUM PRESSURE RESPONSE
AIR PERMEABILITY TEST
Eglin Main Old Fire Training Area (FT-28)
Eglin AFB, Florida

		10' (MPA)		Dis	tance fro	om injecti 20' (MPB)	on well (E	G2-VW)	40' (MPC)	
Depth (feet)	4.5	25.5	38.5		4.5	25.5	38.5	4.5	25.5	38.5
Time (minutes)	150	150	-		125	125	-	150	150	150
Max Pressure (inches H2O)	2.15	2.6	-		1.8	1.77	-	1.4	1.5	1.5

Note: water table may have risen above the screen at the deep monitoring points at MPA and MPB. Readings could not be obtained at these points as shown in Table 3.7.

TABLE 3.8
INFLUENCE OF AIR INJECTION AT VENT WELL
ON MONITORING POINT OXYGEN LEVELS
Eglin Main Old Fire Training Area (FT-28)
Eglin AFB, Florida

	Distance from VW	Screen Depth	Initial O2	Final O2 (%) End of	O2 After 17 Hours
3.65		-		2	
MP	(ft)	(ft)	(%)	Permeability Tes	of Injection
EG2-MPA-Shallow	10	4.5-5.0	0	19.75	19.5
EG2-MPA-Mid depth	10	25.5-26.0	0	20.5	20.8
EG2-MPA-Deep	10	38.5-39	NM	NM	NM
EG2-MPB-Shallow	20	4.5-5.0	0	11.25	17.0
EG2-MPB-Mid depth	20	25.5-26.0	0	5.5	20.8
EG2-MPB-Deep	20	38.5-39	0	NM	NM
				•	
EG2-MPC-Shallow	40	4.5-5.0	0	0	0
EG2-MPC-Mid depth	40	25.5-26.0	0	0	0
EG2-MPC-Deep	40	38.5-39	0	11	19.5
_					

NM- Not Measured (unable to draw sample-suspected a clogged screen or screen in water table)

TABLE 3.9
SUMMARY OF OXYGEN UTILIZATION RATES
Eglin Main Old Fire Training Area (FT-28)
Eglin AFB, Florida

Monitoring Point	Oxygen Utilization Rate (%/minute)
EG2-MPA-4.5-5.0'	0.0042
EG2-MPB-25.5-26'	0.0035
EG2-MPC-38.5-39'	0.0013

# Page 1

# Initial Respiration Test Egiln FTA (EG2) Egiln AFB, Florida

Column   C	•		Days Elapsed			Days	Elapsed Time			Total					
Data   Change   Cha			Elapsed		_	•			_						
ODITIONS         TOTAL DIAGNA			-		_	Inpsed	(mln. x						Trend of 02		
03/16/94         0 00   15:00         0 01   0 10         0 0 10			days)	TIM.	daye)	7	1000)	-	C02%	┪		Сощ	Time	x-values	¥
03/18/19/19/19/19/19/19/19/19/19/19/19/19/19/		18/94		11:25	0.01	0.01	0.01	20.8	0.50	S <sub>Z</sub>		Temperature = 58.7	20.058575		0.004181
03118744   1.00 019830   0.35 0 0.35   0.50 1 1.0 0 0 0.50   0.50 0 0.35   0.50 0 0.35   0.50 0 0.35   0.50 0 0.35   0.50 0 0.35   0.50 0 0.35   0.50 0 0.35   0.50 0 0.35   0.35 0 0.35   0.35 0 0.35   0.35 0 0.35   0.35 0 0.35   0.35 0 0.35   0.35 0 0.35 0 0.35   0.35 0 0.35 0 0.35   0.35 0 0.35 0 0.35   0.35 0 0.35 0 0.35   0.35 0 0.35 0 0.35   0.35 0 0.35 0 0.35   0.35 0 0.35   0.35 0 0.35 0 0.35   0.35 0 0.35 0 0.35   0.35 0 0.		18/94		15:00	0.16	0.16	0.23	20.0	0 60	SZ	1 30		1.4103543	4	
0317874   100 06:53   -0.05   0.94   1.55   1.45   0.90   0.32   0.075     0317874   1.00 10:22   0.05   1.17   1.17   1.18   1.18   1.18   0.05   0.27     0317874   1.00 12:26   0.47   1.47   1.47   2.1   1.10   1.20   0.20   0.20     0317874   2.00 0.34   0.10   1.11   3.14   5.20   0.20   0.30     0317874   2.00 0.34   0.10   1.11   3.14   5.20   0.20   0.00   0.35     0317874   2.00 0.35   0.11   2.1   3.04   5.5   2.30   510.00   0.45     0317874   3.00 0.13   3.4   0.10   3.10   4.45   3.5   3.5   3.5   3.5   3.5   3.5     0317874   3.00 0.13   3.4   0.10   3.10   4.45   3.5   3.5   3.5   3.5   3.5   3.5     0317874   3.00 0.13   3.4   0.10   3.10   4.45   3.5   3.5   3.5   3.5   3.5   3.5   3.5   3.5     0317874   3.00 0.13   3.4   0.10   3.10   4.45   3.		18/94			0.35	0 35	0.50	19.7	0.70	82	0.89				
03120194   100   17 20   0.25   1.25   1.81   1.18   1.70   5.800   NS   NS   NS   NS   NS   NS   NS		19/94	1.00	09:53	90.0-	0.94	1.36	14.0	0.90	3,200	0 75				
03120194   100   22 20   03 1   10   0   10   0   0   0   0   0   0	Γ	19/94	1.00	17:20	0.25	1.25	1.8.1	11.8	1.70	5,800	Ş				
03120194   2 00   034 0	T	19/94	1.00	22:25	0.47	1.47	2.11	10 0	2.00	7,200	0.27				
0.31720/94   2 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	T	20/94	2 00	03.40	-0.31	1.69	2.43		2.60	9.000					
031720194   2 00   13 57   0 11 2 11 3 0 4 5   2 0 9   10 000 0 4 5   0 0 1 4 5   0 0 1 4 5   0 0 1 4 5   0 0 1 4 5   0 0 1 4 5   0 0 1 0 1 2 1 1   0 0 1 1   0 0 1	T	20/94	2.00	00 60	60 0-	1.91	2.75		2.00	>10,000	0 39				
03120194   2 00   9 3   0 0 2   0 0	T	20/94	2.00	13.57	0.11	2.11	3.04		2.30	>10,000	0 45				
03121/94   3 00   08 57   -0 09   2 91   4 16   4 6   10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	T	20/94			0.35	2.35	3.38		3.80	>10,000					
	Г	21/94	3 00	08:57	60.0-	2.91	4.18		4.80	>10,000	0 25				
03/18/194         0.00         11.30         0.01         0.02         0.02		21/94	3.00	13:34	0.10	3.10	4.46		2.00	>10,000	2				
03/18/94         0 00 11:30         0 01 0 01 <t< th=""><th></th><th></th><th>•</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<>			•												
03/18/94         0 0 1 5 0 1         0 1 6 0 16         0 1 6 0 16         0 1 6 0 16         0 1 6 0 16         0 1 6 0 16         0 1 6 0 16         0 1 6 0 16         0 1 6 0 16         0 1 6 0 16         0 1 6 0 16         0 1 6 0 16         0 1 6 0 16         0 1 6 0 16         0 1 7 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		18/94	00.00	11:30	0.01	0.01	0.05	20.5	0 50	SZ			20.708051	0	0 003476
03/18/94         0 0 19:36         0.35         0.35         0.30		18/94	00.00	15:01	0.16	0.16	0.23	20.5	0.50	92	1.20		5.204501		
03/19/94         1 00 09 56         0 05 0 05         1 37 16 5 0 80 4800 0 68         4800 0 68         0 08           03/19/94         1 00 17:22         0 26 1 26         1 26 1 26         1 81 1 43 1 50 760 0 166         NS           03/19/94         1 00 17:22         0 26 1 26         1 24 1 12 2 50 10.000 0 46         1 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		18/94			0.35	0.35	0.50	20.5	0.60	2	1 00				
03/19/94         1 00         17:22         0.26         1 26         1 26         1 26         1 26         1 26         1 26         1 26         1 26         1 26         1 27         1 212         1 212         1 212         1 212         1 212         1 212         1 212         1 212         1 20         2 20         0 3/20/94         2 00         3 03.66         0 3.66		19/94	1.00	85:60	-0.05	0.95	1.37	16.5	0.80	4.800					
03/19/94         1 00         22:30         0 47         1 47         2 12         1 2 12         1 2 12         1 2 12         1 2 12         1 2 12         1 2 12         1 2 12         2 14         1 13         2 50         1 0,000         0 46         6         6         6         1 1,000         0 46         6         6         1 1,000         0 46         6         6         1 1,000         0 46         6         6         1 1,000         0 46         6         6         1 1,000         0 46         6         6         1 1,000         0 46         6         6         1 1,000         0 14         6         1 1,000         0 14         6         1 1,000         0 14         6         1 1,000         0 1,000         0 14         6         1 1,000         0 1,000 <th< td=""><th></th><td>19/94</td><td>1 00</td><td>17.22</td><td>0.26</td><td>1.26</td><td>1.81</td><td>14.3</td><td>1 30</td><td>7.500</td><td>2</td><td></td><td></td><td></td><td></td></th<>		19/94	1 00	17.22	0.26	1.26	1.81	14.3	1 30	7.500	2				
03/20/94         2 00         03:50         -0.31         1.69         2.44         11.3         2.50         10.000         0.46           03/20/94         2 00         03:64         -0.09         1.91         2.75         9.1         3.00         0.79           03/20/94         2 00         03:04         -0.09         1.91         2.75         9.1         3.00         0.59           03/20/94         2 00         0.93         2.00         0.15         3.00         0.15         3.00         0.15         3.00         0.14         4.14         4.19         8.1         4.90         >10,000         0.14         4.14         4.19         8.1         4.90         >10,000         0.14         4.14         4.16         8.6         5.10         >10,000         0.14         4.14         4.16         8.6         5.10         >10,000         0.14         4.14         4.14         8.1         4.90         >10,000         0.00         1.14         4.14         4.14         8.6         5.10         >10,000         0.00         1.14         4.14         1.14         4.14         8.1         4.90         >10,000         0.00         1.14         4.14         4.14         8.1	П	19/94	1.00	22:30	0.47	1.47	2.12	12.8	1.90	9,200	0 56				
03/20/94         2 00 09:04         -0 08         1 91         2 75         9 1         3 00         >10,000         0 79           03/20/94         2 00 14:02         0.12         2 12         3.05         8 5         3 50         >10,000         0 58           03/20/94         2 00 14:02         0.16         2 35         3.06         8 5         3 50         >10,000         0 58           03/21/94         3 00 16:36         0.09         1.00<		20/94	2.00	03.50	-0.31	- 1	2.44	1.3	2.50	10,000	0 46				
03/20/94         2 00 14:02         0 12 2 12         3 05         8 5 3 50         >10 000         0 58           03/20/94         2 00 19:36         0 35         2 36         3 00         0 14 Hellum meter not working correctly.           03/21/94         2 00 19:36         0 35         2 36         3 30         8 5 3 80         >10,000         0 14 Hellum meter not working correctly.           03/21/94         3 00 18:36         0 10         2 10         4 16         6 5 10         >10,000         0 30           03/18/94         0 00 15:02         0 16         0 16         0 23         20.3         0 50         NS         1 40         140         15 57601         4 46           03/18/94         0 00 15:02         0 16         0 23         20.3         0 50         NS         1 40         15 57601         4 46           03/18/94         0 00 15:02         0 16         0 23         20.3         0 50         NS         1 40         15 57601         4 46           03/18/94         1 00 10:02         0 16         0 18         0 18         0 18         0 18         0 18         1 40         15 57601         4 46           03/18/94         1 00 10:02         0 25         0 20         0 60		20/94	2.00	09:04	60.0-	- 1	2.75	6	3.00	×10.000	0.79				
mm         03/21/94         2 00 19:36         0.35         2.35         3.36         8.5         3.80         >10,000         0 14 Helium meter not working correctly.           mm         03/21/94         3.00 08:59         -0.09         2.91         4.19         8.1         4.90         >10,000         0.30         MS           mm         03/21/94         3.00 08:59         -0.09         2.91         4.19         8.1         4.90         >10,000         0.30         MS         1.40         MS <th< th=""><th></th><th>20/94</th><th>2.00</th><th>14:02</th><th>0 12</th><th>- 1</th><th>3.05</th><th>8.5</th><th>3.50</th><th>×10.000</th><th>0 58</th><th></th><th></th><th></th><th></th></th<>		20/94	2.00	14:02	0 12	- 1	3.05	8.5	3.50	×10.000	0 58				
mm         03/21/94         3.00         08:59         -0.09         2.91         4.19         8.1         4.90         >10.000         NS           mm         03/21/94         3.00         13:35         0.10         3.10         4.46         6.6         5.10         >10.000         0.30           mm         03/18/94         0.00         11:34         0.01         0.01         0.02         20:5         0.50         NS         1.40           03/18/94         0.00         15:22         0.16         0.23         20:3         0.50         NS         1.40         1.55/601         4.46           03/18/94         0.00         15:22         0.50		20/94	2.00	19.36	0 35		3.38	8.5	3.80	×10.000	0 14	Helium meter not working correctly.			
m         03/21/94         3 00 13:35         0 10         3 10         4.46         6.6         5 10         >10,000         0 30           03/18/94         0 00 11:34         0 01         0 01         0 02         20.5         0.50         NS         1 40         15.57601         4.46           03/18/94         0 00 15:02         0 16         0 20         20.5         0.50         NS         1 40         15.57601         4.46           03/18/94         0 00 19:40         0 .016         0 .05		21/94	3.00	08:59	60.0-		4.19	8	4.90	×10,000	2				
03/18/94         0.00         11:34         0.01         0.02         20.5         0.50         NB         1 40         21:210732         0           03/18/94         0.00         15:02         0.16         0.23         20.5         0.50         NB         1 40         15:57601         4.46           03/18/94         0.00         19:40         0.35         0.35         0.51         20.8         0.60         NB         0.75         1.46         15:57601         4.46           03/18/94         1.00         10:22         0.05         0.51         20.8         0.60         1.200         0.98         0.98         0.00<	$\neg$	21/94	3 00	13:35	0.10	3.10	4.46	9.9	5.10	>10,000					
03/18/94         0 00   11:34         0 01   0 01   0 02   20.5   0.50   NS   140           NS   140           140           21.210/32           0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0										-					
03/18/94         0.00 15:02         0.16         0.16         0.23         20.3         0.50         NS         1.40           03/18/94         0.00 19:40         0.35         0.35         0.51         20.8         0.60         NS         0.75 Helium meter needs charged         15.57601         4.           03/18/94         1.00 10:02         -0.05         0.95         1.37         20.0         0.60         1.200         0.98           03/18/94         1.00 17:24         0.26         1.26         1.81         1.95         0.60         3.000         0.39           03/20/94         2.00 03:53         0.47         1.47         2.12         19.0         0.60         3.000         0.60 <t< th=""><th>1</th><th>18/94</th><th>0.00</th><th>11:34</th><th>0.01</th><th>9</th><th>0.05</th><th>20.5</th><th>0.50</th><th>2</th><th>\$</th><th></th><th>21.210/32</th><th></th><th>0.001263</th></t<>	1	18/94	0.00	11:34	0.01	9	0.05	20.5	0.50	2	\$		21.210/32		0.001263
03/18/94         0 00 19:40         0.35         0.35         0.51         20.8         0.60         NS         0.75 Helium m           03/18/94         1.00 10:22         -0.05         0.95         1.37         20.0         0.60         1.200         0.98           03/18/94         1.00 17:24         0.26         1.26         1.81         19.5         0.60         2.200         NS           03/20/94         2.00 03:53         -0.31         1.62         2.44         18.3         0.60         3,800         0.39           03/20/94         2.00 09:07         -0.09         1.91         2.75         180         0.70         4,300         0.89           03/21/94         3.00 09:07         -0.09         1.91         2.75         180         0.70         4,300         0.89           03/21/94         3.00 13:36         0.10         2.91         4.16         1.58         0.60         8,400         NS	1	18/94	0.00	15:02	0.16	0.16	0.23	20.3	0.50	2	<del>Q</del>		15.5/601		
03/19/94         1.00         10.02         -0.05         0.95         1.37         20.0         0.60         1,200         0.98           03/19/94         1.00         17.24         0.26         1.26         1.81         19.5         0.60         2,200         NS           03/19/94         1.00         22.32         0.47         1.47         2.12         19.0         0.60         3,000         0.39           03/20/94         2.00         03.63         -0.03         1.91         2.74         18.3         0.60         3,800         0.60           03/20/94         2.00         09.07         -0.09         1.91         2.75         18.0         0.70         4,300         0.89         Gct 0.77           03/21/94         2.00         19.38         0.35         2.35         3.39         17.0         0.70         NS         NS           03/21/94         3.00         0.90         -0.09         2.91         4.19         15.8         0.80         NS		18/94			0.35	0.35	0.51	20.8	9	2	0 75	Helium meter needs charged			
03/19/94         1.00         17:24         0.26         1.26         1.81         19.5         0.60         2,200         NS           03/19/94         1.00         22:32         0.47         1.47         2.12         19.0         0.60         3,000         0.39           03/20/94         2.00         03:53         -0.31         1.58         2.44         18.3         0.60         3,800         0.60           03/20/94         2.00         09:07         -0.03         1.91         2.75         18.0         0.70         4,300         0.89         Got 0.77           03/21/94         2.00         19:38         0.35         2.35         3.39         17.0         0.70         NS         NS           03/21/94         3.00         09:09         -0.09         2.91         4.19         15.8         0.80         8,400         NS           03/21/94         3.00         13:36         0.10         3.10         4.46         14.8         0.90         >10,000         0.63		19/94			-0.05	0.95	1.37	20.0	0.60	1.200	0.98				
03/18/94         1:00         22:32         0.47         1:47         2:12         19:0         0:60         3;000         0:39           03/20/94         2:00         03:53         -0.31         1:58         2:44         18:3         0:60         3;800         0:60           03/20/94         2:00         09:07         -0.09         1:91         2:75         18:0         0:70         4;300         0:89         Got 0:77           03/20/94         2:00         19:38         0:35         2:35         3:39         17:0         0:70         NS         NS           03/21/94         3:00         09:09         -0.09         2:91         4:19         15:8         0:80         8;400         NS           03/21/94         3:00         13:36         0:10         3:10         4:46         14:8         0:90         >10:00         0:53		19/94	1.00	17:24	0.26	1.26	1.81	19.5	0.60	2,200	2				
03/20/94         2.00         03:53         -0.31         1.58         2.44         18.3         0.60         3,800         0.60           03/20/94         2.00         09:07         -0.09         1.91         2.75         18.0         0.70         4,300         0.89         Got 0.77           03/20/94         2.00         19:38         0.35         2.35         3.39         17.0         0.70         NS         NS           03/21/94         3.00         09:00         -0.09         2.91         4.19         15.8         0.80         8,400         NS           03/21/94         3.00         13:36         0.10         3.10         4.46         14.8         0.90         >10,000         0.63		18/94	1 00	22:32	0.47	1.47	2.12	19.0	0.60	3,000	0 39			,	
03/20/94         2.00         09:07         -0.09         1.91         2.75         18.0         0.70         4,300         0.89         Got 0.77           03/20/94         2.00         19:38         0.35         2.35         3.39         17.0         0.70         NS         NS           03/21/94         3.00         09:09         -0.09         2.91         4.19         15.8         0.80         8,400         NS           03/21/94         3.00         13:36         0.10         3.10         4.46         14.8         0.90         >10,000         0.63		20/94	2.00	03:53	-0.31	1.59	2.44	18.3	0.60	3,800	0.60				
03/20/94         2.00         19:38         0.35         2.35         3.39         17.0         0.70         NS           03/21/94         3.00         19:38         0.09         2.91         4.19         15.8         0.80         8,400           03/21/94         3.00         13:36         0.10         3.10         4.46         14.8         0.90         >10,000         0		20/94	2.00	09:07	60.0-	1.91	2.75	18.0	0.70	4,300	0 89	Got 0.77			
03/21/94         3.00         09:00         -0.09         2.91         4.19         15.8         0.80         8,400           03/21/94         3.00         13:36         0.10         3.10         4.46         14.8         0.90         >10,000         0	-	20/94	2.00	19:38	0.35	2.35	3.39	17.0	0.70	9	Z				
03/21/94 3.00 13:36 0.10 3.10 4.46 14.8 0.90 >10,000 0		21/94			-0.09	2.91	4.19	15.8	0.80	8,400	2				
		21/94	3.00	13.36	0.10	3.10	4.46	14.8	0.90	>10,000					

# APPENDIX A ANALYTICAL DATA FOR AIR SAMPLES AT FT-39

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 9403129

Work Order Summary

CLIENT:

Ms. Diana Schenfeld

BILL TO: Same

Engineering Science

1700 Broadway, Suite 900

Denver, CO 80290

PHONE:

303-831-8100

**INVOICE #** 3240

FAX:

303-831-8208

P.O. # DE268.43.040

DATE RECEIVED:

3/16/94

PROJECT # DE268.43.040 Eglin AFB

DECEDA

**DATE COMPLETED:** 3/24/94 **AMOUNT\$:** \$462.87

			RECEIPI	
FRACTION #	NAME	<u>TEST</u>	VAC./PRES.	PRICE
01A	EG3-VW	TO-3	1.5 "Hg	\$120.00
02A	EG3-MPA Shallow	TO-3	3.0 "Hg	\$120.00
02B	EG3-MPA Shallow Duplicate	TO-3	3.0 "Hg	NC
03A	EG3-MPC Shallow	TO-3	<b>2.0</b> "Hg	\$120.00
04A	Method Spike	TO-3	NA	NC
05A	Lab Blank	TO-3	NA	NC

Misc. Charges

1 Liter SUMMA Canister Preparation (3) @ \$10.00 each.

\$30.00

Shipping (2/28/94)

\$72.87

CERTIFIED BY Laboratory Director

DATE: 3/24/94

180 BLUE RAVINE ROAD, SUITE B • FOLSOM, CA 95630 (916) 985-1000 • FAX (916) 985-1020 Page 1

SAMPLE NAME: EG3-VW ID#: 9403129-01A

#### **EPA METHOD TO-3**

(Aromatic Volatile Organics in Air)

## GC/PID

File Name: 6031707	4		Date of Collecti Date of Analysi	
Dil. Factor: 270  Compound	Det. Limit	Det. Limit	Amount	Amount
	(ppmv)	(uG/L)	(ppmv)	(uG/L)
Benzene Toluene Ethyl Benzene Total Xylenes	0.27	0.88	32	100
	0.27	1.0	20	77
	0.27	1.2	8.5	38
	0.27	1.2	35	150

# TOTAL PETROLEUM HYDROCARBONS GC/FID

(Quantitated as Jet Fuel)

File Name: 6031707 Dil. Factor: 270		Array Control of the	Date of Collect Date of Analysi	
Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH*	2.7	18	14000	91000

<sup>\*</sup>TPH referenced to Jet Fuel (MW=156)

SAMPLE NAME: EG3-MPA Shallow ID#: 9403129-02A

## **EPA METHOD TO-3**

(Aromatic Volatile Organics in Air)

### GC/PID

File Name: 6031708 Dil. Factor: 220			Date of Collect Date of Analysi	
	Det. Limit	Det. Limit	Amount	Amount
Compound	(ppmv)	(uG/L)	(ppmv)	(uG/L)
Benzene	0.22	0.71	24	<b>7</b> 8
Toluene	0.22	0.84	19	73
Ethyl Benzene	0.22	0.97	6.8	30
Total Xylenes	0.22	0.97	30	130

# TOTAL PETROLEUM HYDROCARBONS GC/FID

(Quantitated as Jet Fuel)

File Name:       6031708         Dil. Factor:       220	493 L		Date of Collect Date of Analysi	7 (1 ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )
Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH*	2.2	14	13000	84000

\*TPH referenced to Jet Fuel (MW=156)

#### 9403129 Engineering Science

# AIR TOXICS LTD.

SAMPLE NAME: EG3-MPA Shallow Duplicate ID#: 9403129-02B

#### **EPA METHOD TO-3**

(Aromatic Volatile Organics in Air)

## GC/PID

File Name: 6031709 Dil. Factor: 220			Date of Collect Date of Analysi	
	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Compound		0.71	23	75
Benzene	0.22		18	69
Toluene	0.22	0.84	= =	
Ethyl Benzene	0.22	0.97	6.7	30
Total Xylenes	0.22	0.97	29	130

# TOTAL PETROLEUM HYDROCARBONS GC/FID

(Quantitated as Jet Fuel)

File Name: 6031709 Dil. Factor: 220			Date of Collect Date of Analysi	
Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH*	2.2	14	12000	78000

\*TPH referenced to Jet Fuel (MW=156)

SAMPLE NAME: EG3-MPC Shallow ID#: 9403129-03A

## **EPA METHOD TO-3**

(Aromatic Volatile Organics in Air)

### GC/PID

File Name: 6031710 Dil. Factor: 270			Date of Collecti Date of Analysi	•
	Det. Limit	Det. Limit	Amount	Amount
Compound	(ppmv)	(uG/L)	(ppmv)	(uG/L)
Benzene	0.27	0.88	53	170
Toluene	0.27	1.0	100	380
Ethyl Benzene	0.27	1.2	21	93
Total Xylenes	0.27	1.2	170	750

# TOTAL PETROLEUM HYDROCARBONS GC/FID

(Quantitated as Jet Fuel)

File Name: 6031710 Dil. Factor: 270	10, 10 mm		Date of Collecti Date of Analysi	
Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH*	2.7	18	26000	170000

\*TPH referenced to Jet Fuel (MW=156)

SAMPLE NAME: Method Spike ID#: 9403129-04A

#### **EPA METHOD TO-3**

(Aromatic Volatile Organics in Air)

## GC/PID

File Name:         6031701           Dil. Factor:         1.0	and the second	Table 1	Date of Collection: NA Date of Analysis: 3/17/94
	Det. Limit	Det. Limit	
Compound	(ppmv)	(uG/L)	% Recovery
Benzene	0.001	0.003	108
Toluene	0.001	0.004	106
Ethyl Benzene	0.001	0.004	103
Total Xylenes	0.001	0.004	104

# TOTAL PETROLEUM HYDROCARBONS GC/FID

(Quantitated as Jet Fuel)

File Name: 6031703 Dil. Factor: 1.0			Date of Collection: NA Date of Analysis: 3/17/94
Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	% Recovery
TPH*	0.010	0.065	109

\*TPH referenced to Jet Fuel (MW=156)

Container Type: NA

SAMPLE NAME: Lab Blank ID#: 9403129-05A

#### **EPA METHOD TO-3**

(Aromatic Volatile Organics in Air)

#### GC/PID

File Name: 6031705 Dil. Factor: 1.0	Large Company		Date of Collecti Date of Analysi	
Compound	Det. Limit	Det. Limit	Amount	Amount
	(ppmv)	(uG/L)	(ppmv)	(uG/L)
Benzene Toluene Ethyl Benzene Total Xylenes	0.001	0.003	Not Detected	Not Detected
	0.001	0.004	Not Detected	Not Detected
	0.001	0.004	Not Detected	Not Detected
	0.001	0.004	Not Detected	Not Detected

# TOTAL PETROLEUM HYDROCARBONS GC/FID

(Quantitated as Jet Fuel)

File Name: 6031705 Dil. Factor: 1.0			Date of Collecti Date of Analysi	
Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH*	0.010	0.065	Not Detected	Not Detected

\*TPH referenced to Jet Fuel (MW=156)

Container Type: NA

FIGURE B.3

7 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -	Air Toxics Ltd.	180 Blue Ravine Rd.	Suite B Folsom California 95630	Allii. Alakis moryami	Months Remarks	AIR .5 WE	3.0 "Kg	C AUR 2,0 TK 03A	C AIR	C AM	C AIR	C AIR	C AIR	C AR	G C AIR	C AM	C AIR	C AIR	O C AIR	a c Aun	Q C AIR		Shirt control on 3/10/4y	ENGINEERING-SCIENCE, INC.
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CHAIN OF CUST	AFCEE BIOVENTING PILOT TE818	Boos Kolin Atts, M. Mygre Torre	HURIBURT FTA	Shared or Market		Description 1.D.	7	MOTIVE	PC strouters													Date / Thme Rectored for Laboratory by: (B4	Dete Time Rechard for Laboratory by:	& Shipman Copies to: Coordinates Flats Flore
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AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 9403252

Work Order Summary

CLIENT:

Ms. Diana Schenfeld

BILL TO: Same

**Engineering Science** 

1700 Broadway, Suite 900

Denver, CO 80290

PHONE:

303-831-8100

FAX:

303-831-8208

DATE RECEIVED:

3/30/94

DATE COMPLETED: 4/5/94

**INVOICE #** 3335

**P.O.** # 722409.43040

**PROJECT #** 722409.43040 Eglin AFB

**AMOUNT\$:** \$140.00

RECEIPT

FRACTION #

NAME

EG3-EAFB2-1

**TEST** ASTM D-1945 VAC./PRES. 1.5 "Hg

**PRICE** \$140.00

01A 02A

Lab Blank

ASTM D-1945

NA

.NC

CERTIFIED BY: Junda J. Furma Laboratory Director

DATE: 4/5/94

180 BLUE RAVINE ROAD, SUITE B • FOLSOM, CA 95630 (916) 985-1000 • FAX (916) 985-1020 Page 1

SAMPLE NAME: EG3-EAFB2-1 ID#: 9403252-01A

## NATURAL GAS ANALYSIS by ASTM D-1945 GC/TCD/FID

File Name:		of Collection: 3/21/94 of Analysis: 3/31/94
24, 140,01	<del></del>	

Compound	Det. Limit (%)	Amount (%)
Methane	0.002	Not Detected
Ethane	0.002	Not Detected
Propane	0.002	Not Detected
Isobutane	0.002	Not Detected
Butane	0.002	Not Detected
Neopentane	0.002	Not Detected
Isopentane	0.002	Not Detected
n-Pentane	0.002	Not Detected

SAMPLE NAME: Lab Blank ID#: 9403252-02A

## NATURAL GAS ANALYSIS by ASTM D-1945 GC/TCD/FID

Compound	Det. Limit (%)	Amount (%)
Methane	0.001	Not Detected
Ethane	0.001	Not Detected
Propane	0.001	Not Detected
Isobutane	0.001	Not Detected
Butane	0.001	Not Detected
Neopentane	0.001	Not Detected
Isopentane	0.001	Not Detected
n-Pentane	0.001	Not Detected

Container Type: NA

# ENGINEERING SCIENCE CHAIN OF CUSTODY RECORD

			/ PRESERVATIVE REQUIRED	REQUIRED	SHIP TO:
ES JOB NO.	PROJECT NAME/LOCATION		1111		ICS LTD,
722409.43043	722409.43040 EGLIN AFB, HURLBURT FTA (EG3)			<i>    :      </i>	180 BLUE RAVINE AD. STE. B
SAMPLER(S): (Signature)	dnature)	_	ANALYSES REQUIRED	auineb	FOLSOM, CA 95630
STEVE CA	RATE LAFF	-	HJ.		ATTN: ALEXIS MERYDITH
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				G-Grab	

OIA

Distribution Original Accompanies Shipment. Yellow Copy Returned With Report. Pink Retained by Laboratory. Gold Retained by Sender.

G-Grab C-Composite

# (a) AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

**WORK ORDER #:** 9403205

Work Order Summary

Copy to
Cla Awssikn
ES-Atlanta

CLIENT:

Ms. Diana Schenfeld

BILL TO: Same

**Engineering Science** 

1700 Broadway, Suite 900

Denver, CO 80290

PHONE:

303-831-8100

FAX:

01A 02A

303-831-8208

DATE RECEIVED:

3/24/94

DATE COMPLETED: 3/30/94

**INVOICE # 3286** 

P.O. # 722409.43040

**PROJECT # 722409.43040 Eglin AFB** 

**AMOUNT\$:** \$130.00

FRACTION #

NAME

EG3-EAFB2-1

Lab Blank

**TEST** TO-3

**TO-3** 

VAC./PRES. 1.5 "Hg

RECEIPT

NA

PRICE \$120.00

NC

Misc. Charges

1 Liter SUMMA Canister Preparation (1) @ \$10.00 each.

\$10.00

CERTIFIED BY:

Laboratory Director

SAMPLE NAME: EG3-EAFB2-1 ID#: 9403205-01A

#### **EPA METHOD TO-3**

(Aromatic Volatile Organics in Air)

#### GC/PID

File Name: 6032422 Dil. Factor: 2.1			Date of Collecti Date of Analysi	
	Det. Limit	Det. Limit	Amount	Amount
Compound	(ppmv)	(uG/L)	(ppmv)	(uG/L)
Benzene	0.002	0.007	Not Detected	Not Detected
Toluene	0.002	0.008	Not Detected	Not Detected
Ethyl Benzene	0.002	0.009	Not Detected	Not Detected
Total Xylenes	0.002	0.009	0.027	0.12

## TOTAL PETROLEUM HYDROCARBONS GC/FID

(Quantitated as Jet Fuel)

File Name: 6032422 Dil. Factor: 2.1			Date of Collect Date of Analysi	
	Det. Limit	Det. Limit	Amount	Amount
Compound	(ppmv)	(uG/L)	(ppmv)	(uG/L)
TPH*	0.021	0.14	2.0	13
C2 - C4** Hydrocarbons	0.021	0.038	Not Detected	Not Detected

<sup>\*</sup>TPH referenced to Jet Fuel (MW=156)

<sup>\*\*</sup>C2 - C4 Hydrocarbons referenced to Propane (MW=44)

SAMPLE NAME: Lab Blank ID#: 9403205-02A

#### **EPA METHOD TO-3**

(Aromatic Volatile Organics in Air)

## GC/PID

File Name: 6032406 Dil. Factor: 1.0	e de la companya de l	7070 463633 466633	Date of Collecti Date of Analysi	
	Det. Limit	Det. Limit	Amount	Amount
Compound	(ppmv)	(uG/L)	(ppmv)	(uG/L)
Benzene	0.001	0.003	Not Detected	Not Detected
Toluene	0.001	0.004	Not Detected	Not Detected
Ethyl Benzene	0.001	0.004	Not Detected	Not Detected
Total Xylenes	0.001	0.004	Not Detected	Not Detected

## TOTAL PETROLEUM HYDROCARBONS GC/FID

(Quantitated as Jet Fuel)

File Name: 6032406 Dil. Factor: 1.0			Date of Collecti Date of Analysi	
	Det. Limit	Det. Limit	Amount	Amount
Compound	(ppmv)	(uG/L)	(ppmv)	(uG/L)
TPH*	0.010	0.065	Not Detected	Not Detected
C2 - C4** Hydrocarbons	0.010	0.018	Not Detected	Not Detected

<sup>\*</sup>TPH referenced to Jet Fuel (MW=156)

Container Type: NA

<sup>\*\*</sup>C2 - C4 Hydrocarbons referenced to Propane (MW=44)

# ENGINEERING SCIENCE CHAIN OF CUSTODY RECORD

**940**320552

	MOITE WALL COAT	PRESERVATIVE REQUIRED	E REQUIRED / SHIP TO:	
ES JUB NO.	THOSECI NAME/LOCATION			AIR TOXICS LTD,
722409.4304	722409.43040 EGLIN AFB, HURLBURT FTA (EG3)		1	180 BLUE RAVING RO. STE. B
蕊	ignature)	ANALYSES REQUIRED		, CA 956.30
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Distribution Original Accompanies originally, retoy regiment by Laboratory. Gold Retained by Sender.

C-Composite

# APPENDIX B ANALYTICAL DATA FOR AIR SAMPLES AT FT-28

# (a) AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

**WORK ORDER #:** 9403143

Work Order Summary

CLIENT:

Ms. Diana Schenfeld

BILL TO: Same

**Engineering Science** 

1700 Broadway, Suite 900

Denver, CO 80290

PHONE:

303-831-8100

FAX:

303-831-8208

DATE RECEIVED: DATE COMPLETED: 3/24/94

3/17/94

**INVOICE # 3239** 

P.O. # DE268.43.04

PROJECT # DE268.43.04 Eglin AFB

DECEIDT

**AMOUNT\$:** \$390.00

			RECEIP I	
FRACTION #	NAME	<u>TEST</u>	VAC./PRES.	PRICE
01A	EG2-VW	TO-3	1.0 "Hg	\$120.00
02A	EG2-MPA-Shallow	TO-3	1.0 "Hg	\$120.00
03A	EG2-MPC-Deep	TO-3	1.5 "Hg	\$120.00
04A	Lab Blank	TO-3	NA	NC

Misc. Charges

1 Liter SUMMA Canister Preparation (3) @ \$10.00 each.

\$30.00

Laboratory Director

DATE: 9/94/94

SAMPLE NAME: EG2-VW ID#: 9403143-01A

#### **EPA METHOD TO-3**

(Aromatic Volatile Organics in Air)

### GC/PID

File Name: 603171 Dil. Factor: 26			Date of Collect Date of Analysi	
	Det. Limit	Det. Limit	Amount	Amount
Compound	(ppmv)	(uG/L)	(ppmv)	(uG/L)
Benzene	0.26	0.84	94	300
Toluene	0.26	1.0	52	200
Ethyl Benzene	0.26	1.1	20	88
Total Xylenes	0.26	1.1	76	340

# TOTAL PETROLEUM HYDROCARBONS GC/FID

(Quantitated as Jet Fuel)

File Name: 6031711 Dil. Factor: 260		98.00	Date of Collect Date of Analysi	
Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH*	2.6	17	11000	71000

\*TPH referenced to Jet Fuel (MW=156)

SAMPLE NAME: EG2-MPA-Shallow ID#: 9403143-02A

#### **EPA METHOD TO-3**

(Aromatic Volatile Organics in Air)

## GC/PID

File Name: 6031712 Dil. Factor: 260			Date of Collect Date of Analysi	
Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene Toluene	0.26 0.26	0.84 1.0 1.1	93 24 20	300 92 88
Ethyl Benzene Total Xylenes	0.26 0.26	1.1	64	280

# TOTAL PETROLEUM HYDROCARBONS GC/FID

(Quantitated as Jet Fuel)

File Name: 6031712 Dil. Factor: 260			Date of Collect Date of Analysi	
	Det. Limit	Det. Limit	Amount	Amount
Compound	(ppmv)	(uG/L)	(ppmv)	(uG/L)
TPH*	2.6	17	11000	71000

\*TPH referenced to Jet Fuel (MW=156)

SAMPLE NAME: EG2-MPC-Deep ID#: 9403143-03A

#### **EPA METHOD TO-3**

(Aromatic Volatile Organics in Air)

## GC/PID

File Name: 6031713 Dil. Factor: 530			Date of Collect Date of Analysi	
	Det. Limit	Det. Limit	Amount	Amount
Compound	(ppmv)	(uG/L)	(ppmv)	(uG/L)
Benzene	0.53	1.7	250	810
Toluene	0.53	2.0	460	1800
Ethyl Benzene	0.53	2.3	47	210
Total Xylenes	0.53	2.3	220	970

# TOTAL PETROLEUM HYDROCARBONS GC/FID

(Quantitated as Jet Fuel)

File Name:       6031713         Dil. Factor:       530			Date of Collect Date of Analysi	
Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH*	5.3	34	26000	170000

\*TPH referenced to Jet Fuel (MW=156)

SAMPLE NAME: Lab Blank ID#: 9403143-04A

#### **EPA METHOD TO-3**

(Aromatic Volatile Organics in Air)

## GC/PID

File Name: 6031705 Dil. Factor: 1.0	A STATE OF THE STA		Date of Collecti Date of Analysi	
	Det. Limit	Det. Limit	Amount	Amount
Compound	(ppmv)	(uG/L)	(ppmv)	(uG/L)
Benzene	0.001	0.003	Not Detected	Not Detected
Toluene	0.001	0.004	Not Detected	Not Detected
Ethyl Benzene	0.001	0.004	Not Detected	Not Detected
Total Xylenes	0.001	0.004	Not Detected	Not Detected

# TOTAL PETROLEUM HYDROCARBONS GC/FID

(Quantitated as Jet Fuel)

File Name: 6031705 Dil. Factor: 1.0			Date of Collecti Date of Analysi	***
Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH*	0.010	0.065	Not Detected	Not Detected

<sup>\*</sup>TPH referenced to Jet Fuel (MW=156)

Container Type: NA

FIGURE B.3

CHAIN OF CUSTODY RECORD

		CHAIN OF	CUSIO	OF CUSIOUY RECORD	10	Bhlp To:	ö	
CINEEDING SCIENCE, INC.	AFCEE BIOVEN	AFCEE BIOVENTING PILOT TEBTB						
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1	BILL OLD FEGUR FITA	~ F1A		4	Part of	Suite B Folsom	Suite B Fotsom California 95630	
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EG2 -	MPA-SHALLOW				<u> </u>	<del>!</del>	1.5" Ha	£ 00
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Forder's Expense Number:			1			103) 631	8100	
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# APPENDIX C ANALYTICAL DATA FOR SOILS AT FT-28 AND FT-39

SOL

FINAL REPORT FOR SAMPLES RECEIVED: 03/07/94

**FOR** 

EGLIN AFB SITE: OLD EGLIN FTA

PACE PROJECT NUMBER: 730307502

PREPARED FOR:

ENGINEERING SCIENCE, INC. 1700 BROADWAY SUITE 900 DENVER, COLORADO 80290

**APRIL, 1994** 

PREPARED BY:

Maria Company Company Company Company

PACE INCORPORATED

5702 BOLSA AVENUE

HUNTINGTON BEACH, CALIFORNIA 92649

CONTRACT NO. DE-268.19.06.08

#### **TABLE OF CONTENTS**

SECTION I. COVER LETTER

SECTION II. CHAIN OF CUSTODY

SECTION III. CROSS REFERENCE TABLE

SECTION IV. INORGANIC SECTION

TOTAL RECOVERABLE

PETROLEUM HYDROCARBONS

**DATA PACKAGE** 

**IRON DATA PACKAGE** 

WET CHEMISTRY DATA PACKAGE

SECTION V. ORGANIC SECTION

SW8020 (BTEX) DATA PACKAGE

SECTION VI. GLOSSARY OF ACRONYMS AND

**SYMBOLS** 

SECTION VII. SUBCONTRACTED ANALYSIS

TOTAL KJELDAHL NITROGEN

**PHOSPHATE** 

**SOIL CLASSIFICATION** 

**SECTION I** 

COVER LETTER



April 7, 1994

Mr. Doug Downey ENGINEERING SCIENCE - DENVER 1700 Broadway, Suite 900 Denver, Colorado 80290

Re:

**PACE Project No. 740307.502** 

Milanie R. Concepio

Client Reference: AFCEE-EGLIN AFB

Dear Mr. Downey:

Enclosed is the report of laboratory analysis for three (3) soil samples received on March 7, 1994. These samples were delivered by Federal Express and received by PACE-Huntington Beach. The Chain of Custody indicated these samples to be analyzed for pH, alkalinity, iron, moisture content, BTEX, and TRPH using methods SW9045, A403(M), SW7380, D2216, SW8020, and E418.1, respectively. Total Kjedahl Nitrogen, phosphate and soil classification were subcontracted out to Sequoia Analytical in Redwood City, CA. All results are reported on a dry-weight basis.

A glossary of acronyms and symbols are found in Section VI.

If you have any questions regarding this report, please feel free to contact us.

Sincerely,

Melanie R. Concepcion

Project Manager

PACE-Southern California

THESE DATA HAVE BEEN REVIEWED AND ARE APPROVED FOR RELEASE.

Kenneth D. Faust Regional Director

PACE-Southern California

740307.502

SECTION II
CHAIN OF CUSTODY

730307.508

FIGURE B.2

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- Page -	BIND TO: A LINE MICHALLE PANCERIONE	PACE LABORATORY	4+ Digital Drive Sn2 605A AV.	Novato, California 94949	Macy Hook 6 6 ACH	5950-062 (414)		Remerks						<u>ال</u>	Mc 3/30/44					·					RED @ 4.30 GW		O - Orab Sample, G - Composte bempre	ENGINEERING-SCIENCE, INC. 1700 Broadway, Bulle 500 - Derwer, Colorado (303) 531-8100	CO9004
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# SECTION III CROSS REFERENCE TABLE

FIELD/LABORATORY IDENTIFIER												
	CROSS-REFERENCE TABLE											
	PACE PF	ROJECT NUMBER:	740307502									
DATE	DATE	PACE SAMPLE	FIELD SAMPLE									
COLLECTED	RECEIVED	IDENTIFIER	IDENTIFIER									
03/03/94 03/04/94 03/04/94	03/07/94 03/07/94 03/07/94	750031647 750031655 750031663	EG2-VW-3' EG2-VMPA-39' EG2-VMPB-2-4'									

## SECTION IV INORGANIC SECTION

## TOTAL RECOVERABLE PETROLEUM HYDROCARBONS DATA PACKAGE

EPA Method:

E418.1

Ext/Prep Method:

SW3550

AFIID: EGLIN

Contract/Donum: NA

LOCID: NA

740307502 Project:

PACE Sample ID:

750031647

Batch ID:

7511962

Client Sample ID:

EG2-VW-3'

Date Collected:

03-Mar-94

SBD: 0

Date Received:

07-Mar-94

SED: 0

Date Ext/Prep:

12-Mar-94

SACODE: N1

Date Analyzed:

14-Mar-94

Percent Moisture: 6.0

Soil

Dilution Factor: 25

Matrix:

	(MG	/KG)
Compound	Result	PQL
Total Petroleum Hydrocarbons	2210	133
End Of Results For Method		

EPA Method:

E418.1

Ext/Prep Method:

SW3550

AFIID: EGLIN

LOCID: NA

Project: 740307502

PACE Sample ID:

750031655

Contract/Donum: NA

Batch ID:

7511962

Client Sample ID:

EG2-VMPA-39'

Date Collected: Date Received:

04-Mar-94

SBD: 0

Date Ext/Prep:

07-Mar-94 12-Mar-94

SED: 0 SACODE: N1

Date Analyzed:

14-Mar-94

Percent Moisture: 7.0

Compound

Soil

Dilution Factor: 25

Matrix:

(MG/KG)

PQL

Total Petroleum Hydrocarbons

3370

Result

134

End Of Results For Method

EPA Method:

E418.1

AFIID: EGLIN

Ext/Prep Method:

SW3550

LOCID: NA

Project: 740307502

PACE Sample ID:

750031663

7511962

Batch ID: Client Sample ID:

EG2-VMPB-2-4'

Contract/Donum: NA

Date Collected:

04-Mar-94

SBD: 0

Date Received:

07-Mar-94

SED: 0

Date Ext/Prep:

12-Mar-94

SACODE: N1

Date Analyzed:

14-Mar-94

Percent Moisture: 7.6

Matrix:

Soil

	(MG/	(KG)
Compound	Result	PQL
Total Petroleum Hydrocarbons	6610	270
End Of Results For Method		

EPA Method:

E418.1

AFIID: EGLIN

Ext/Prep Method:

**METHOD** 

LOCID: LABQC

PACE Sample ID:

758270217

Project: ОC

Batch ID:

7511962

Contract/Donum: NA

Client Sample ID:

Method Blank

Date Collected:

NA

SBD: 0

Date Received:

NA

Date Ext/Prep:

12-Mar-94

SED: 0 SACODE: LB1

Date Analyzed:

14-Mar-94

Percent Moisture: 0

Matrix:

Soil/Solid Quality Control Matrix

	(MG	/KG)
Compound	Result	PQL
Total Petroleum Hydrocarbons	ND	5
End Of Results For Method		

LAB Q.C. BATCH/FIELD I.D.				
		CROSS	-REFERENC	E TABLE
		PACE Pro	oject Number: 7	40307502
QC BATCH	DATE	ANALYTICAL	PACE SAMPLE	FIELD SAMPLE
IDENTIFIER	ANALYZED	METHOD	IDENTIFIER	IDENTIFIER
7511962 7511962 7511962	14-MAR-94 14-MAR-94 14-MAR-94	E418.1 E418.1 E418.1	750031655 750031663 750031647	EG2-VMPA-39' EG2-VMPB-2-4' EG2-VW-3'

Table 4.4.2

		no.	<b>QUALITY CONTROL REPORT</b>	ONTROL	REPORT				
Annitytical Mathod: E418 1						Field Sample ID	9		Solid X Water
Analytical Method: E+10.1 Analytical Batch ID: 7511962 Date of Analysis: 03/14/94				EG2-VW-3'		EG2-VMPA-39'	-39-	EG2-VMPB-2-4'	
Instrument ID: IR #1 Calibration Reference #: 02/18/94									
	Target		Recovery (%)		RPD	RPD (%)			
Outlier Control Samples	Concentrations	Snike	Spike	Control	Besults	Control	Cor	Corrective Action	
County County Campies	DALDER	Durdo	2350						
Laboratory Control Sample List Of Analytes									
Total Petroleum Hydrocarbons	208	<b>8</b>	91	75-125	E.	90			
							-		

**IRON DATA PACKAGE** 

EPA Method:

SW7380

AFIID: EGLIN

LOCID: NA

Ext/Prep Method:

SW3050

Project:

Contract/Donum: NA

740307502

PACE Sample ID:

750031647

Batch ID:

7512062

Client Sample ID:

EG2-VW-3'

Date Collected:

03-Mar-94

Date Received: Date Ext/Prep:

07-Mar-94 16-Mar-94

Date Analyzed:

21-Mar-94

SBD: 0

SED: 0

SACODE: N1

Percent Moisture: 6.0

Matrix:

Soil

	(MG,	/KG)
Compound	Result	PQL
Iron	2560	200
End Of Results For Method		

EPA Method:

SW7380

SW3050

AFIID: EGLIN

Ext/Prep Method:

LOCID: NA

Project: 740307502

PACE Sample ID:

750031655

Batch ID:

. Contract/Donum: NA

Client Sample ID:

7512062 EG2-VMPA-39'

Date Collected:

04-Mar-94

SBD: 0

Date Received:

07-Mar-94

SED: 0

Date Ext/Prep:

16-Mar-94

SACODE: N1

Date Analyzed:

21-Mar-94

Percent Moisture: 7.0

Matrix:

Soil

	(MG	/KG)
Compound	Result	PQL
Iron	135	20
End Of Results For Method		

EPA Method:

SW7380

AFIID: EGLIN

Ext/Prep Method:

SW3050

LOCID: NA

Project: 740307502 Contract/Donum: NA

PACE Sample ID:

750031663

Batch ID:

7512062

Client Sample ID:

EG2-VMPB-2-4'

Date Collected:

04-Mar-94

Date Received:

07-Mar-94

Date Ext/Prep:

16-Mar-94

Date Analyzed:

21-Mar-94

SBD: 0

SED: 0

SACODE: N1

Matrix:

Soil

Percent Moisture: 7.6

	(MG/	KG)
Compound	Result	PQL
Iron	2100	170
End Of Results For Method		

#### 000021

#### REPORT OF LABORATORY ANALYSIS

EPA Method:

SW7380

AFIID: EGLIN

Ext/Prep Method:

SW3050

LOCID: LABQC

PACE Sample ID:

758272821

Method Blank

Project: QC

Batch ID:

Contract/Donum: NA

Client Sample ID:

7512062

Date Collected:

NA

SBD: 0

Date Received:

NA

Date Ext/Prep:

21-Mar-94

SED: 0

SACODE: LB1

Date Analyzed:

21-Mar-94

Percent Moisture: 0

Matrix:

Soil/Solid Quality Control Matrix

,	(MG	/KG)
Compound	Result	PQL
Iron	ND	20
End Of Results For Method		

		LAB Q.	C. BATCH/F	IELD I.D.
,		CROSS	-REFERENC	E TABLE
		PACE Pro	oject Number: 7	40307502
QC BATCH	DATE	ANALYTICAL	PACE SAMPLE	FIELD SAMPLE
IDENTIFIER	ANALYZED	METHOD	IDENTIFIER	IDENTIFIER
7512062 7512062 7512062	21-MAR-94 21-MAR-94 21-MAR-94	SW7380 SW7380 SW7380	750031655 750031663 750031647	EG2-VMPA-39' EG2-VMPB-2-4' EG2-VW-3'

Table 4.4.8

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Analytical Method: SW7380 Analytical Batch ID: 7512062

Date of Analysis: 03/21/94

Instrument ID: FAA #1 Calibration Reference #: 03/21/94

	EG2-VMPB-2-4'
rield sample ID	EG2-VMPA-39'
	EG2-VW-3'

Solid X Water

		Corrective Action		MARKATO COMPANIA				,			
				*							
RPD (%)	Control	Limits		50					**************************************		
RPD		Results		7							
	Control	Limits		80-120			-				
Recovery (%)	Spike	Duplicate		107	٠						
		Spike		105							
Target	Concentrations	(MG/KG)		200		·					
		Quality Control Samples	Laboratory Control Sample List Of Analytes	Iron							

WET CHEMISTRY DATA PACKAGE

EPA Method:

SM403(M)

AFIID: EGLIN

Ext/Prep Method:

**METHOD** 

LOCID: NA Project:

Contract/Donum: NA

740307502

PACE Sample ID:

750031647

Batch ID:

7512016

Client Sample ID:

EG2-VW-3'

Date Collected:

03-Mar-94

Date Received:

07-Mar-94

Date Ext/Prep:

16-Mar-94

SBD: 0

SED: 0

SACODE: N1

Date Analyzed:

16-Mar-94

Percent Moisture: 6.0

Dilution Factor: 1

Matrix:

Soil

(MG/KG)

Compound

354

Result

PQL

42

End Of Results For Method

Alkalinity, Total (As CaCO3)

EPA Method:

SM403(M)

Ext/Prep Method:

**METHOD** 

AFIID: EGLIN

LOCID: NA

Project: 740307502

PACE Sample ID: Batch ID:

750031655

7512016

Client Sample ID:

EG2-VMPA-39'

Contract/Donum: NA

Date Collected:

04-Mar-94

Date Received:

07-Mar-94

Date Ext/Prep:

16-Mar-94

SED: 0 SACODE: N1

SBD: 0

Date Analyzed:

16-Mar-94

Percent Moisture: 7.0

Matrix:

Soil

	(MC	G/KG)
Compound	Result	PQL
Alkalinity, Total (As CaCO3)	ND	42
End Of Results For Method		

EPA Method:

SM403(M)

AFIID: EGLIN

Ext/Prep Method:

**METHOD** 

LOCID: NA

Project: 740307502

PACE Sample ID:

750031663

Contract/Donum:

Batch ID:

7512016

Client Sample ID:

EG2-VMPB-2-4'

Date Collected:

04-Mar-94

Date Received:

07-Mar-94

Date Ext/Prep:

16-Mar-94

Date Analyzed:

16-Mar-94

SBD: 0

SED: 0

SACODE: N1

Matrix:

Soil

Percent Moisture: 7.6

	(MG/KG)				
Compound	Result	PQL			
Alkalinity, Total (As CaCO3)	128	43			
End Of Results For Method					

EPA Method:

SM403(M)

METHOD

AFIID: EGLIN

Project: QC

LOCID: LABQC

PACE Sample ID:

Ext/Prep Method:

758271744

Batch ID:

7512016

Client Sample ID:

Method Blank

Date Collected:

NA

SBD: 0

Contract/Donum: NA

Date Received:

NA

SED: 0

Date Ext/Prep:

16-Mar-94

SACODE: LB1

Date Analyzed:

16-Mar-94

Percent Moisture: 0

Matrix:

Soil/Solid Quality Control Matrix

Compound	(N Result	MG/KG	S) PQL
Alkalinity, Total (As CaCO3)  End Of Results For Method	ND		40

# LAB Q.C. BATCH/FIELD I.D. CROSS-REFERENCE TABLE PACE Project Number: 740307502 NALYTICAL PACE SAMPLE FIELD SAMPLE IDENTIFIER

QC BATCH	DATE ANALYZED	ANALYTICAL METHOD	PACE SAMPLE IDENTIFIER	FIELD SAMPLE IDENTIFIER
7512016	16-MAR-94	SM403(M)	750031655	EG2-VMPA-39'
7512016	16-MAR-94	SM403(M)	750031663	EG2-VMPB-2-4'
7512016	16-MAR-94	SM403(M)	750031647	EG2-VW-3'

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7

Calibration Reference #: 03/16/94

Analytical Method: SM403(M)

7512016

Analytical Batch ID:

Date of Analysis: 03/16/94

Instrument ID: NA

EG2-VW-3

Field Sample ID

EG2-VMPA-39'

EG2-VMPB-2-4

Solid X Water

	Corrective Action						
RPD (%)	Control Limits		20				
GAB	Results		2				
	Control Limits		75-125				
Recovery (%)	Spike Duplicate		95				
	Spike		97				
Target	Concentrations (MG/KG)		1760				
	Ouality Control Samples	Laboratory Control Sample List Of Analytes	Alkalinity, Total (As CaCO3)				

EPA Method:

D2216

AFIID: EGLIN

Ext/Prep Method:

**METHOD** 

LOCID: NA

Project: 740307502

PACE Sample ID:

750031647

Contract/Donum:

Batch ID:

7511886

Client Sample ID:

EG2-VW-3'

Date Collected:

03-Mar-94

Date Received:

07-Mar-94

Date Ext/Prep: Date Analyzed: 09-Mar-94

09-Mar-94

SBD: 0

SED: 0

SACODE: N1

Percent Moisture: 6.0

Matrix:

Soil

	(PERC	ENT)
Compound	Result	PQL
Moisture, Percent	6	NA
End Of Results For Method		

EPA Method:

D2216

AFIID: EGLIN

Ext/Prep Method:

**METHOD** 

LOČID: NA

SBD: 0

Project: 740307502

PACE Sample ID:

750031655

Contract/Donum: NA

Batch ID:

7511886

Client Sample ID:

EG2-VMPA-39'

Date Collected:

04-Mar-94

Date Received:

07-Mar-94

Date Ext/Prep:

09-Mar-94

SED: 0 SACODE: N1

Date Analyzed:

09-Mar-94

Percent Moisture: 7.0

Matrix:

Soil

	(PEF	RCENT)
Compound	Result	PQL
Moisture, Percent	. 7	NA
End Of Results For Method		

#### 000033

#### REPORT OF LABORATORY ANALYSIS

EPA Method:

D2216

Ext/Prep Method:

AFIID: EGLIN

**METHOD** 

LOCID: NA

Project: 740307502

PACE Sample ID:

750031663

Contract/Donum: NA

Batch ID:

7511886

Client Sample ID:

EG2-VMPB-2-4'

Date Collected: Date Received:

04-Mar-94 07-Mar-94

Date Ext/Prep:

09-Mar-94

SBD: 0

SED: 0

Date Analyzed:

09-Mar-94

SACODE: N1

Percent Moisture: 7.6

Matrix:

Soil

	(PERC	CENT)
Compound	Result	PQL
Moisture, Percent	7.6	NA
End Of Results For Method		

EPA Method:

D2216

Ext/Prep Method:

**METHOD** 

AFIID: EGLIN

LOCID: LABQC Project: QC

PACE Sample ID:

758268646

Contract/Donum: NA

Batch ID:

7511886

Client Sample ID:

Method

SBD: 0

Date Collected: Date Received:

NA NA

SED: 0

Date Ext/Prep:

09-Mar-94

SACODE: LB1

Date Analyzed:

09-Mar-94

Percent Moisture: 0

Matrix:

Soil/Solid Quality Control Matrix

Blank

·	(PE	RCENT	)
Compound	Result		PQL
Moisture, Percent	ND		NA
End Of Results For Method			

EPA Method:

SW9045

AFIID: EGLIN

Ext/Prep Method:

**METHOD** 

LOCID: NA

Project: 740307502

PACE Sample ID:

750031647

Batch ID:

7511924

Contract/Donum: NA

Client Sample ID:

EG2-VW-3'

Date Collected:

03-Mar-94

Date Received: Date Ext/Prep:

07-Mar-94 10-Mar-94

Date Analyzed:

10-Mar-94

SBD: 0

SED: 0

SACODE: N1

Percent Moisture: 6.0

Matrix:

Soil

Dilution Factor: 1

(PH UNITS) PQL Result Compound

рΗ

8.2

NA

End Of Results For Method

EPA Method:

SW9045

Ext/Prep Method:

**METHOD** 

AFIID: EGLIN

LOCID: NA

Contract/Donum: NA

Project: 740307502

SBD: 0

SED: 0

SACODE: N1

PACE Sample ID:

750031655

7511924

Client Sample ID:

Batch ID:

EG2-VMPA-39'

Date Collected:

04-Mar-94

Date Received:

07-Mar-94

Date Ext/Prep:

10-Mar-94

Date Analyzed:

10-Mar-94

Matrix:

Soil

Percent Moisture: 7.0

	(PH I	INITS)
Compound	Result	PQL
рН	6.6	NA
End Of Results For Method		

EPA Method:

SW9045

**METHOD** 

AFIID: EGLIN

Ext/Prep Method:

LOČID: NA Project:

740307502

PACE Sample ID:

750031663

Contract/Donum: NA

Batch ID:

7511924

Client Sample ID:

EG2-VMPB-2-4'

Date Collected:

04-Mar-94

Date Received:

07-Mar-94

Date Ext/Prep: Date Analyzed:

10-Mar-94

10-Mar-94

SBD: 0

SED: 0

SACODE: N1

Matrix:

Soil

Percent Moisture: 7.6

	(PH	(PH UNITS)	
Compound	Result	PQL	
рН	7.8	NA	
End Of Results For Method			

## SECTION V ORGANICS SECTION

SW8020 (BTEX) DATA PACKAGE

EPA Method:

SW8020

AFIID: EGLIN

Ext/Prep Method:

SW5030

LOCID: NA

Contract/Donum: NA

Project: 740307502

PACE Sample ID:

750031647

Batch ID:

7511968

Client Sample ID:

EG2-VW-3'

Date Collected:

03-Mar-94

Date Received:

07-Mar-94

Date Ext/Prep: Date Analyzed:

08-Mar-94

08-Mar-94

SBD: 0 SED: 0

SACODE: N1

Matrix:

Soil

Percent Moisture: 6

	(MG/	(MG/KG)	
Compound	Result	PQL	
Benzene Toluene Ethylbenzene Xylenes, Total	10 21 24 72	5.3 5.3 5.3 7.4	
End Of Results For Method			

EPA Method:

SW8020

AFIID: EGLIN

Ext/Prep Method:

SW5030

LOCID: NA Project: 740307502

PACE Sample ID:

750031655

Contract/Donum: NA

Batch ID:

7511968

Client Sample ID:

EG2-VMPA-39'

04-Mar-94

Date Collected: Date Received:

07-Mar-94

Date Ext/Prep:

08-Mar-94

Date Analyzed:

08-Mar-94

SBD: 0

SED:

SACODE: N1

Matrix:

Soil

Percent Moisture: 7

	(MG	(MG/KG)	
Compound	Result	PQL	
Benzene	0.15	0.067	
Toluene Ethylbenzene	0.19	0.067 0.067	
Xylenes, Total	2.5	0.094	

EPA Method:

SW8020

AFIID: EGLIN

Ext/Prep Method:

SW5030

LOCID: NA

PACE Sample ID:

750031663

Project: 740307502

Batch ID:

7511968

Contract/Donum:

NA

Client Sample ID:

EG2-VMPB-2-4'

Date Collected:

04-Mar-94

Date Received:

07-Mar-94

Date Ext/Prep:

08-Mar-94

Date Analyzed:

08-Mar-94

SBD: 0 SED: 0

SACODE: N1

Matrix:

Soil

Percent Moisture: 7.6

	(MG	(MG/KG)	
Compound	Result	PQL	
Benzene Toluene Ethylbenzene Xylenes, Total	ND ND 9.9 22	2.7 2.7 2.7 3.8	
End Of Results For Method			

EPA Method:

SW8020

AFIID: EGLIN LOCID: LABQC

Ext/Prep Method:

SW5030

Project: QC

PACE Sample ID:

758270500

Batch ID:

7511968

Contract/Donum: NA

Client Sample ID:

Method Blank

SBD: 0

Date Collected: Date Received:

NA

NA

SED: 0

Date Ext/Prep:

07-Mar-94

SACODE: LB1

Date Analyzed:

07-Mar-94

Percent Moisture: 0

Matrix:

Soil/Solid Quality Control Matrix

	(MG/KG)	
Compound	Result	PQL
Benzene	ND	0.0005
Toluene	ND	0.0005
Ethylbenzene	ND	0.0005
Xylenes, Total	ND	0.0007
End Of Results For Method		

### REPORT OF LABORATORY ANALYSIS SURROGATE PERCENT RECOVERY REPORT

**EPA Method:** 

SW8020

AFB: VNBRG

Matrix:

Soil

Project: 740307502

Batch ID:

7511968

Client	PACE S1 Sample No.	S1	Out of Limits
Sample ID			
EG2-VW-3'	750031647	94	0
EG2-VMPA-39'	750031655	79	0
EGS-VMPB-2-4'	750031663	92	0
Method Blank	758270500	100	О
Laboaratory Control	758270535	102	0
LCS Duplicate	758270543	100	0

QC LIMITS

S1 = a,a,a-Trifluorotoluene

60-140

D = Surrogate diluted out

<sup>\* =</sup> Values outside of Q.C. Limits

LAB Q.C. BATCH/FIELD I.D.								
	CROSS-REFERENCE TABLE							
	PACE Project Number: 740307502							
QC BATCH	DATE	ANALYTICAL	PACE SAMPLE	FIELD SAMPLE				
IDENTIFIER	ANALYZED	METHOD	IDENTIFIER	IDENTIFIER				
7511968 7511968 7511968	08-MAR-94 08-MAR-94 08-MAR-94	SW8020 SW8020 SW8020	750031655 750031663 750031647	EG2-VMPA-39' EG2-VMPB-2-4' EG2-VW-3'				

# QUALITY CONTROL REPORT

( · · · · · · · · · · · · · · · · · · ·

Calibration Reference #: 03/01/94

Analytical Batch ID: 7511968 Analytical Method: SW8020

Date of Analysis: 03/07/94 Instrument ID: GC #4

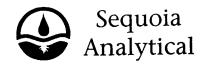
		Corrective Action						
		_						
(%)	Control	Limits		18	17	15	16	
(%) QAB		Results		6	6	∞	∞	
	Control	Limits		73-125	77-123	72-125	76-123	
Recovery (%)	Spike	Duplicate		95	96	66	100	
		Spike		103	105	107	108	
Target	Concentrations	(MG/KG)		0.02	0.02	0.02	90.0	
		Quality Control Samples	Laboratory Control Sample List Of Analytes	Benzene	Toluene	Ethylbenzene	Xylenes, Total	

# SECTION VI GLOSSARY OF ACRONYMS AND SYMBOLS

# GLOSSARY OF ACRONYMS AND SYMBOLS

ACRONYM/SYMBOL	DEFINITION
MDL	Method Detection Limit
NA	Not applicable.
NC	Not calculated.
ND	Not Detected
RPD	Relative Percent Difference.
D .	Detectable.
J	Detected but below the PQL; therefore, result is an estimated concentration.
X	Please see NCR Ref. No.:

# SECTION VII SUBCONTRACTED ANALYSIS



680 Chesapeake Drive 1900 Bates Avenue, Suite L Concord, CA 94520 819 Striker Avenue, Suite 8 Sacramento, CA 95834

Redwood City, CA 94063

(415) 364-9600 (510) 686-9600 (916) 921-9600 FAX (415) 364-9233 FAX (510) 686-9689 FAX (916) 921-0100

Pace

5702 Bolsa Ave.

Huntington Beach, CA 92649 Attention: Melanie Concepcion Client Project ID: Sample Descript:

**EGLIN AFB** 

Soil

Total Kjeldahl Nitrogen

Analysis for: First Sample #: 4C62601 Sampled:

Mar 7, 1994

Received:

Mar 8, 1994

Analyzed: Reported: Mar 16, 1994 Mar 23, 1994

LABORATORY ANALYSIS FOR:

Total Kjeldahl Nitrogen

Sample Number	Sample Description	Detection Limit mg/kg	Sample Result mg/kg
4C62601	EG2-VW-3'(3-3)	43	N.D.
4C62602	EG2-VMPA-39'(3-4)	43	N.D.
4C62603	EG2-VMPB-2-4'(3-4)	43	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

**SEQUOIA ANALYTICAL** 

Tom Fowler **Project Manager**  Please Note:

Sample results are reported on a dry weight basis. % moistures faxed by client 3-22-94.

4C62601.PPP <1>



680 Chesapeake Drive 1900 Bates Avenue, Suite L 819 Striker Avenue, Suite 8 Sacramento, CA 95834

Redwood City, CA 94063 Concord, CA 94520

(415) 364-9600 (510) 686-9600 (916) 921-9600 FAX (415) 364-9233 FAX (510) 686-9689 FAX (916) 921-0100

Pace 5702 Bolsa Ave. Huntington Beach, CA 92649 Attention: Melanie Concepcion Client Project ID: Sample Descript: Analysis for:

**EGLIN AFB** Soil

**Phosphorus** 

Sampled: Received: Mar 7, 1994 Mar 8, 1994

First Sample #:

4C62601

Mar 17, 1994

Reported:

Analyzed: Mar 23, 1994

ı	AROF	RATO	RY A	ΝΔΙΝ	212	FOR:
	MUUI	1710				

#### **Phosphorus**

Sample Number	Sample Description	Detection Limit mg/kg	Sample Result mg/kg
4C62601	EG2-VW-3'(3-3)	1.1	28
4C62602	EG2-VMPA-39'(3-4)	1.1	29
4C62603	EG2-VMPB-2-4'(3-4)	1.1	15

Analytes reported as N.D. were not present above the stated limit of detection.

**SEQUOIA ANALYTICAL** 

Tom Fowler **Project Manager**  Please Note:

Sample results are reported on a dry weight basis. % moisture faxed by client 3-22-94. Samples were analyzed by 365.2.

4C62601.PPP <2>



680 Chesapeake Drive 1900 Bates Avenue, Suite L 819 Striker Avenue, Suite 8

Redwood City, CA 94063 Concord, CA 94520 Sacramento, CA 95834

(415) 364-9600 (510) 686-9600 (916) 921-9600 FAX (415) 364-9233 FAX (510) 686-9689 FAX (916) 921-0100

Pace

5702 Bolsa Ave.

Huntington Beach, CA 92649 Attention: Melanie Concepcion Client Project ID:

Matrix:

Solid

**EGLIN AFB** 

QC Sample Group: 4C62601-03

Reported:

Mar 23, 1994

#### **QUALITY CONTROL DATA REPORT**

ANALYTE	Total Kjeldahl Nitrogen	Phosphorous	
Method:	EPA 351.4	EPA 365.2 K. Newberry	
Analyst:	S. Flynn	K. Newbelly	
MS/MSD			
Batch#:	4034751	4C27305	
Date Prepared:	3/16/94	3/15/94	
Date Analyzed:	3/16/94	3/15/94	
Instrument I.D.#:	N/A	•	
Conc. Spiked:	4000 mg/kg	100 mg/kg	
Matrix Spike % Recovery:	109	90	
Matrix Spike Duplicate % Recovery:	109	100	
Relative % Difference:	0.0	11	

LCS Batch#:

LCS031794

**Date Prepared:** Date Analyzed: 3/17/94 3/17/94

Instrument I.D.#:

LCS %

Recovery:

**SEQUOIA ANALYTICAL** 

99

60-140

% Recovery

**Control Limits:** 60-140

Please Note:

The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

Tom Fowler Project Manager

## SEQUOIA ANALYTICAL LABORATORY

Particle Size Distribution by Sieve and Hydrometer

Method: ASTM D422-63

Analyzed: 3/16/94

Sample Description: SOIL

Lab ID: 9403626-01

Client ID: EG2-VW-3

SIEVE TEST

A. Total weight of sample:

B. Weight retained in No.10 sieve:

212.91 g 2.35 g 98.90 %

C. % passing No.10 sieve:

Sieve test for weight retained in a No.10 sieve.

	WEIGHT	%	CUMULATIVE	CUMULATIVE
SIEVE SIZE	RETAINED(g)	RETAINED	% RETAINED	% PASSING
1 1/2 in	0.00	0.00	0.00	100.00
3/8 in	0.00	0.00	0.00	100.00
No. 4	0.26	0.12	0.12	99.88
No. 10	2.09	0.98	1.10	98.90
No. 200	193.33	90.80	91.91	8.09

#### **HYDROMETER TEST**

ELAPSED	ТЕМР.	HYDROMETER	CORRECTED		PARTICLE
TiME (min)	(deg C)	READING (H)	READING (R)	(L)	DIAM. in mm (S)
2	20	15	11	14.5	0.0368
5	20	14	10	14.7	0.0234
10	20	13	9	14.8	0.0166
15	20	13	9	14.8	0.0136
25	20	12	8	15	0.0106
40	20	12	8	15	0.0084
60	20	12	8	15	0.0068
90	20	12	8	15	0.0056
120	20	11	7	15.2	0.0049
1440	20	10	6	15.3	0.0014

% SUSPENDED
(P)
9.5
8.6
7.7
7.7
6.9
6.9
6.9
6.9
6.0
5.2

Weight of soil used in hydrometer test (D):

Hydroscopic moisture correction factor (G):

Specific gravity (Assumed):

Dispersing agent correction factor (E):

Meniscus correction factor (F):

Temp./Spec. gravity dependant constant (K):

115 g 1 2.65 3 1 0.01365

Formulas:

R = H - E - F

S = K[SQRT(L/T)]

P = (R/W)100

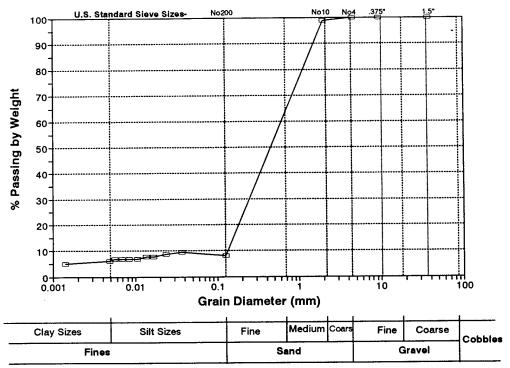
 $W = (J \times 100)/C$ 

 $J = D \times G$ 

Tombolis

Method: **ASTM D422-63** Analyzed: 3/16/94 Lab ID: 9403626-01

## **Graph of Acquired Data**



Graphing Data:					
Part. Diam.	Percent				
(mm)	Suspended				
37.5	100.00				
9.5	100.00				
4.5	99.88				
2	98.90				
0.127	8.09				
0.0368	9.46				
0.0234	8.60				
0.0166	7.74				
0.0136	7.74				
0.0106	6.88				
0.0084	6.88				
0.0068	6.88				
0.0056	6.88				
0.0049	6.02				
0.0014	5.16				

Sample Composition:		
(1) Gravel, passing 3-in. and		
retained on No. 4 sieve	0.1	_%
(2) Sand, passing No. 4 sieve and		
retained on No. 200 sieve	91.8	_%
(3) Silt size, 0.074 to 0.005 mm	2.1	_%
(4) Clay size, smaller than 0.005 mm	6.0	%

# SEQUOIA ANALYTICAL LABORATORY

Particle Size Distribution by Sieve and Hydrometer

Method: ASTM D422-63

Analyzed: 3/16/94

Sample Description: SOIL

Lab ID: 9403626-02

Client ID: EG2-VMPA-39

SIEVE TEST

A. Total weight of sample:

B. Weight retained in No.10 sieve:

C. % passing No.10 sieve:

239.58 g 0.09 g 99.96 %

Sieve test for weight retained in a No.10 sieve.

	WEIGHT	%	CUMULATIVE	CUMULATIVE
SIEVE SIZE	RETAINED(g)	RETAINED	% RETAINED	% PASSING
1 1/2 in	0.00	0.00	0.00	100.00
3/8 in	0.00	0.00	0.00	100.00
No. 4	0.00	0.00	0.00	100.00
No. 10	0.09	0.04	0.04	99.96
No. 200	221.56	92.48	92.52	7.48

#### **HYDROMETER TEST**

ELAPSED	ТЕМР.	HYDROMETER	CORRECTED		PARTICLE
TIME (min)	(deg C)	READING (H)	READING (R)	(L)	DIAM. in mm (5)
2	20	14	10	14.7	0.0370
5	20	9	5	15.5	0.0240
10	20	9	5	15.5	0.0170
15	20	9	5	15.5	0.0139
25	20	9	5	15.5	0.0107
40	20	9	5	15.5	0.0085
60	20	8	4	15.6	0.0070
90	20	8	4	15.6	0.0057
120	20	8	4	15.6	0.0049
1440	20	7	3	15.8	0.0014

% SUSPENDED
(P)
<del>`</del>
8.7
4.3
4.3
4.3
4.3
4.3
3.5
3.5
3.5
2.6

Weight of soil used in hydrometer test (D):

Hydroscopic moisture correction factor (G):

Specific gravity (Assumed):

Dispersing agent correction factor (E):

Meniscus correction factor (F):

Temp./Spec. gravity dependant constant (K):

115 g 2.65 3

0.01365

Formulas:

R = H - E - F

s = K[SQRT(L/T)]

P = (R/W)100

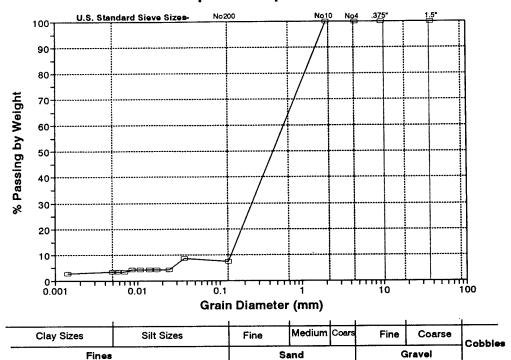
 $W = (J \times 100)/C$ 

 $J = D \times G$ 

Jon Fall

Method: **ASTM D422-63** Analyzed: 3/16/94 Lab ID: 9403626-02

#### **Graph of Acquired Data**



Graphir	ng Data:
Part. Diam.	Percent
(mm)	Suspended
37.5	100.00
9.5	100.00
4.5	100.00
2	99.96
0.127	7.48
0.0370	8.69
0.0240	4.35
0.0170	4.35
0.0139	4.35
0.0107	4.35
0.0085	4.35
0.0070	3.48
0.0057	3.48
0.0049	3.48
0.0014	2.61

Sample Composition:		
(1) Gravel, passing 3-in. and		
retained on No. 4 sieve	0.0	<b>.</b> %
(2) Sand, passing No. 4 sieve and		
retained on No. 200 sieve	92.5	_%
(3) Silt size, 0.074 to 0.005 mm	4.0	_%
(4) Clay size, smaller than 0.005 mm	3.5	%

### SEQUOIA ANALYTICAL LABORATORY

Particle Size Distribution by Sieve and Hydrometer

Method: ASTM D422-63

Analyzed: 3/16/94

Lab ID: 9403626-03

Client ID: EG2-VMPB-2-4

Sample Description: SOIL

**SIEVE TEST** 

A. Total weight of sample:

B. Weight retained in No.10 sieve:

C. % passing No.10 sieve:

225.88 g 1.19 g 99.47 |%

Sieve test for weight retained in a No.10 sieve.

	WEIGHT	%	CUMULATIVE	CUMULATIVE
SIEVE SIZE	RETAINED(g)	RETAINED	% RETAINED	% PASSING
1 1/2 in	0.00	0.00	0.00	100.00
3/8 in	0.00	0.00	0.00	100.00
No. 4	0.00	0.00	0.00	100.00
No. 10	1.19	0.53	0.53	99.47
No. 200	207.01	91.65	92.17	7.83

#### HYDROMETER TEST

ELAPSED	ТЕМР.	HYDROMETER	CORRECTED		PARTICLE
TIME (min)	(deg C)	READING (H)	READING (R)	(L)	DIAM. in ram (S)
2	20	14	10	14.7	0.0370
5	20	14	10	14.7	0.0234
10	20	13	9	14.8	0.0166
15	20	12	8	15	0.0137
25	20	12	8	15	0.0106
40	20	11	7	15.2	0.0084
60	20	11	7	15.2	0.0069
90	20	11	7	15.2	0.0056
120	20	11	7	15.2	0.0049
1440	20	10	6	15.3	0.0014

% SUSPENDED
(P)
8.6
8.6
7.8
6.9
6.9
6.1
6.1
6.1
6.1
5.2

Weight of soil used in hydrometer test (D):

Hydroscopic moisture correction factor (G):

Specific gravity (Assumed):

Dispersing agent correction factor (E):

Meniscus correction factor (F):

Temp./Spec. gravity dependant constant (K):

115 g 2.65 3 1 0.01365

Formulas:

R = H - E - F

s = K[SQRT(L/T)]

P = (R/W)100

 $W = (J \times 100)/C$ 

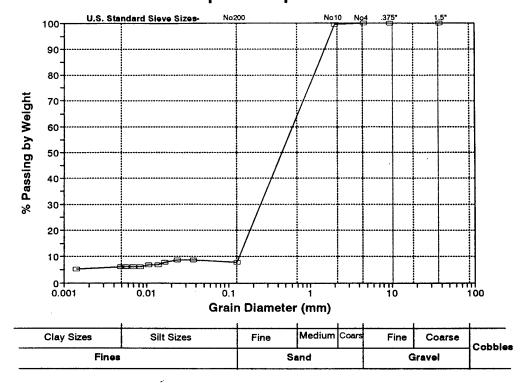
 $J = D \times G$ 

Jon Jamle

Method: ASTM D422-63

Analyzed: 3/16/94 Lab ID: 9403626-03

# **Graph of Acquired Data**



Graphir	ng Data:
Part. Diam.	
(mm)	Suspended
37.5	100.00
9.5	100.00
4.5	100.00
2	99.47
0.127	7.83
0.0370	8.65
0.0234	8.65
0.0166	7.78
0.0137	6.92
0.0106	6.92
0.0084	6.05
0.0069	6.05
0.0056	6.05
0.0049	6.05
.0.0014	5.19

Sample Composition:		
(1) Gravel, passing 3-in. and		
retained on No. 4 sieve	0.0	<b>.</b> %
(2) Sand, passing No. 4 sieve and		
retained on No. 200 sieve	92.2	<b>.</b> %
(3) Silt size, 0.074 to 0.005 mm	1.8	<b>%</b> ^
(4) Clay size, smaller than 0.005 mm	6.1	%



CHAIN-OF-CUSTODY RECORI Analytical Request

Client	Prie	i	REPORT TO: MEZANCE CONCEPCION	Pace Client No.
Addros	0.00		Bill To:	Pace Project Manager
		!	P.O. # / Billing Reference 75-3444	Pare Project No. 74 03 07. 502
ough)		!	Project Name / No. EGLIN AFA	*Requested Due Date: 3 2 [
Sample	Sampled By (PRINT):		PRESERVATIVES ANALYSES PEQUEST	
Sample	Sampler Signature Date Sampled		CONTAI CONTAI CONTAI CONTAI CONTAI	
ITEM	SAMPLE DESCRIPTION TIME	MATHIX PACE NO.	100 до	/ REMARKS
40.	EG2-VW-3' (3-3)	2011	/ XXX	940362601
2	EL2-VMPA-39' (3-4) 4			20
က	2-4'(3.4)	7	XXX /	50
4	F	3.4	-	
ער				
) (		# 1	the second of th	
9		The state of the s	Control of the Contro	the second secon
7		T	the second beautiful and the second s	The second secon
8		SHIPMENT METHOD	ITEM RELINGUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION DATE TIME
	COOLER NOS. BAILERS OUT / DA	TE RETURNED/	Dec V	3-7
Addition	Additional Comments	-	Any)	t-8-6
			والمستعددة المستعددة والمستعددة والمستعدد وا	
				59
			To be the second of the beautiful and the beautiful and the second of the second and the second of the second of	-

SEE REVERSE SIDE FOR INSTRUCTIONS



5702 Bolsa Avenue

Huntington Beach, CA 92649

Copy S. archabal

TEL: 714 892-2565 FAX: 714 890-4032

Atlanta

AWOS. Ka OLA 57 Executive Park South N E , Sulle 590

Fax Transmittal Cover Sheet 30329-226:

Date	:_3-7-94
Го	: DOUG DOWNEY At: ENGINEERING SUINCE
ax #	: (303) 831 -8208
Total # of Page	es (Including This Cover): 5
PACE Project I	No./Department# : 740303,502
Comments	
If you have au	estions regarding this fax transmission, please
Contact: <u>U</u>	4
	uested? Yes No
reshouse red	WC3(CG1 1 00
	•

FIGURE B.2 CHAIN OF CUSTODY RECORD

740303.50F

O CO ATTENTION: Mr. Mawie Quescion AHM: SIBOY HOOK HANGINGEN KENCH 41-Digital Drive 5702 Bolsa AV. 2952-288 Z (415) 883-6100 CA Bonnette O - Orak Sampte, C - Composto Sample Novato, California 94949 PACE LABORATORY 30 1700 Broadssy, Buite 900 - Denver, Coberado (303) 631-8160 ENGINEERING-SCIENCE, INC. REDOC (3/4) ᅙ 뎧 톃 3 **Hog** 3 ᅙ 100 텋 ğ 켷 Earts 2 4 ğ ᅙ 를 Penette 0 0 0 0 C 0 0 0 ပ (၁ ပ ဇ 0 **၁** 0 0 0 **၁** ၀ 3-3 0940 3-2 1600 RONI (CEVES) Date / Thes Dete / Three FORE (9014) E 386.3 UOL ETIFI 24 TA STOH 999 MBI USON HORE (HOU) (AXIA) long by: (Elgnoties) cleved for Laboratory by: (Bignature) (LLI) 48 25 25 M W m NFCEE BUOVENTING PILOT TESTS to Cal Par F13 FED MC 3/7/94 CONTAINISP EGLIN AFE esso: HURLBURY 945 ant. Captes to: Can 06) poskos Length Description MPA-3-5 6-8 3-3 S AMOSIKA 2 Ï DATIBES 808 E63- VW-Ę DK18 ENGINEERING-SCIENCE, INC. ŧ VIA FED Des Broton: Original Accom EG3 E63 Federal Express Hamber: 1700 BAGADWAY, SUITE 900 DENVER, COLORADO BEIRO \$10,431 4 (166 DE 268. 43 - 4708 Att bill Number: NADORN 200 08 80 0830 Personal Spiritual 09/// ES Joh Ho BROKO 18 Holler 43/40 :

E: 3/03/94

PACE

PAGE: 2

5:09 PM SOUTHERN CALIFORNIA REGION

Sample and Analysis Data Entry Form - New Sample(s)

Engineering-Science, Inc.

Client No : 521022

Mr. Doug Downey

: Client Contact

Project No: 740303.502

Due Date: 4/03/94

Client P.O. No:

Sample No: 75 003077.2 Collected Date: 3/02/94 Collected By: O. A.

Lab Rec'd Date: 3/03/94 Checked-In By: GHW Priority: 4

Due Date: 3/17/94 Sample Desc: EG3-MPE-5

Bottle Types: GM GN GN BT

comnt: WALK P-1 (EGLIN AFB-BIOVENT)

Matrix: SOIL

Analysis Abbr:

Name:

pH

AF-SPH V AF-ALK-S

· Alkalinity, Total (As CaCO3)

SAFFAA-FE

AIR FORCE FAA IRON

AF-MOIST V

Moisture, Percent

SAF-BTEX-B V SAF-418.1 V AIR FORCE AROMATIC VOLATILE ORGANICS
AIR FORCE TOTAL PETROLEUM HYDROCARBONS

0-TKN / 0-P04 /

Nitrogen, Total Kjeldahl Total Phosphate

O-DISTCURV V

Grain Size Distribution Curve

M ad

PACE, Inc. reserves the right to return all samples at its discretion.

PACE

3/03/94

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PAGE:
                                                                  1
   5:09 PM
                      SOUTHERN CALIFORNIA REGION
        Sample and Analysis Data Entry Form - New Sample(s)
    Engineering-Science, Inc.
                                                      Client No : 521022
    Mr. Doug Downey
                                                    : Client Contact
    1700 Broadway, Suite 900
                                                    : Address
    Denver, CO. 80290
    303-831-8100
                                                    : Telephone No
    303-831-8208
                                                    : FAX No
                                   3/31/94
                        Due Date: 4/03/94
Project No: 740303.502
                                           Client P.O. No:
                                Project Name: Eglin AFB
       Project Manager: MRC
       Manager's Name: Melanie R. Concepcion
       Project Type:
                        L
       QC Level:
                        В
                               Report Style: M
       Desc: TKN, Phos., Soil Class sent to Sequoia Labs.
Sample No: 75 003075.6 Collected Date: 3/01/94 Vcollected By: O. A.
     Lab Rec'd Date: 3/03/94 Checked-In By: GHW Priority: 4
     Due Date: 3/17/94 Sample Desc: EG3-VW-6-8
     Bottle Types: GM GN GN BT
     Comnt: WALK P-1 (EGLIN AFB-BIOVENT)
                                                       Matrix: SOIL
    Analysis Abbr:
                      Namez
     AF-SPH 🗸
                       рH
     AF-ALK-S V
                     Alkalinity, Total (As CaCO3)
     SAFFAA-FE /
                     AIR FORCE FAA IRON
     AF-MOIST 🗸
                      Moisture, Percent
     SAF-BTEX-B
                      AIR FORCE AROMATIC VOLATILE ORGANICS
     SAF-418.1
                       AIR FORCE TOTAL PETROLEUM HYDROCARBONS
     O-TKN
                       Nitrogen, Total Kjeldahl
             0-P04
                       Total Phosphate
     O-DISTCURV
                       Grain Size Distribution Curve
Sample No: 75 003076.4 Collected Date: 3/02/94 Collected By: O. A.
     Lab Rec'd Date: 3/03/94 Checked-In By: GHW Priority: 4
     Due Date: 3/17/94 Sample Desc: EG3-MPA-3- 5
     Bottle Types: GM GN GN BT
     comnt: WALK P-1 (EGLIN AFB-BIOVENT)
                                                        Matrix: SOIL
     Analysis Abbr:
                       Name:
     AF-SPH V
                       pH
     AF-ALK-S 🗸
                      Alkalinity, Total (As CaCO3)
     Saffaa-fe 🗸
                     AIR FORCE FAA IRON
     AF-MOIST V
                      Moisture, Percent
     SAF-BTEX-B 🗸
                      AIR FORCE AROMATIC VOLATILE ORGANICS
      SAF-418.1 🗸
                       AIR FORCE TOTAL PETROLEUM HYDROCARBONS
             ~
     O-TKN
                       Nitrogen, Total Kjeldahl
     0-P04 V
                                                                   3-7 94
                      Total Phosphate
     O-DISTCURV
                      Grain Size Distribution Curve
PACE, Inc. reserves the right to return all samples at its discretion.
```

INCORPORATED

Dear PACE Client:

The accompanying Sample and Analysis Data Entry form is provided to you as a part of the PACE Incorporated Quality Program. Please review the sample description(s) and analyses listed for each sample. Should there be any discrepancy between the sample and tests listed and the data you have requested, please notify our Client Service Coordinator immediately at (714) 892-2565.

All communications should reference the project number and the individual sample number. Please note the sample due date is for internal use only. The project due date is the scheduled date for completion of your analysis report.

PACE Incorporated reserves the right to dispose of all samples at our discretion. Our standard policy is to return all hazardous or potentially hazardous samples to the client upon completion of the project unless other arrangements are made prior to sample receipt.

If you have any questions, please contact our client services coordinator or me.

Sincerely,

Kenneth Faust

Director

Southern California Region

Los Angeles. Calitornia

P.01

5702 Bolsa Avenue Huntington Beach, CA 92649 TEL: 714 892-2565 FAX: 714 890-4032

# Fax Transmittal Cover Sheet

1 0.	X Hansiiittai Govoi Giloot	War, to
Date	: 3-29-94	Olas-
То	: DONG DOWNEY At: ENGINEEDING	<u>san</u>
Fax #	: (303) 831 -8208	
Total # of Page	es (Including This Cover): 13	
PACE Project N	No./Department# :	
Comments	: Equin AFB	
		LV
		***************************************
	· · · · · · · · · · · · · · · · · · ·	

If you have questions regarding this fax transmission, please

Contact: Mellurie Conception Phone: (714) 892-2565

Response Requested? Yes\_\_\_\_ No\_\_\_\_

# PRELIMINARY: DATA PENDING FINAL REVIEW

March 29, 1994

PACE Project Number: 740307502

Engineering-Science, Inc. 1700 Broadway, Suite 900 Denver, CO 80290

Attn: Mr. Doug Downey

Dilution Factor

Client Reference: Eglin AFB

•					
PACE Sample Number: Date Collected:			75 0031647 03/03/94		
Date Received:			03/07/94		
Client Sample ID:			EG2-VW-3'		
Parameter	Units	MDL		METHOD DATE	E ANALYZED
SUBCONTRACT ANALYSIS					
INDIVIDUAL PARAMETERS					
Grain Size Distribution Curve			SEE ATTACH	ASTM D423	03/16/94
Nitrogen, Total Kjeldahl	mg/kg	43	ND	351.3	03/16/94
Total Phosphate	mg/kg	1.1	28	365.1	03/17/94
INORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Alkalinity, Total (As CaCO3)	MG/KG	42	354	SM403 (M)	03/16/94
Moisture, Percent	PERCENT		6.0	D2216	03/09/94
рн	PH UNITS		8.2	SW9045	03/10/94
AIR FORCE FAA IRON				SW7380	
Soil FAA Metals Date Digested			03/16/94		
Iron	MG/KG	200	2560		03/21/94
ALR FORCE TOTAL PETROLEUM HYDROCARBONS				E418.1	
Soil TPH Prep Date			03/12/94		
Total Petroleum Hydrocarbons	MG/KG	133	2210		03/14/94
ORGANIC ANALYSIS					
AIR FORCE AROMATIC VOLATILE ORGANICS				SW8020	
Benzene	MG/KG	5.3	10		03/08/94
Toluene	MG/KG	5.3	21		03/08/94
Ethylbenzene	MG/KG	5.3	24		03/08/94
Xylenes, Total	MG/KG	7.4	72		03/08/94
a,a,a-Trifluorotoluene	PERCENT		94		03/08/94
Instrument ID #			4		03/08/94
Soil Prep Date			3/8/94		03/08/94
T DATAMA T T					

10000

03/08/94

TO

# PRELIMINARY: DATA PENDING FINAL REVIEW

March 29, 1994

PACE Project Number: 740307502

03/08/94

10000

Engineering-Science, Inc. 1700 Broadway, Suite 900 Denver, CO 80290

Attn: Mr. Doug Downey

Dilution Factor

Client Reference: Eglin AFB

Client Reference: Eglin AFB					
PACE Sample Number: Date Collected: Date Received: Client Sample ID: Parameter	Units	MDL	75 0031647 03/03/94 03/07/94 EG2-VW-3'	METHOD DA	TE ANALYZED
SUBCONTRACT ANALYSTS					
INDIVIDUAL PARAMETERS Grain Size Distribution Curve Nitrogen, Total Kjeldahl Total Phosphate	mg/kg mg/kg	43 1.1	SEE ATTACH ND 28	ASTM D422 351.3 365.1	03/16/94 03/16/94 03/17/94
INORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS Alkalinity, Total (As CaCO3) Moisture, Percent ph	MG/KG PERCENT PH UNITS	42	354 6.0 8.2	SM403 (M) D2216 SW9045	03/16/94 03/09/94 03/10/94
AIR FORCE FAA IRON				SW7380	
Soil FAA Metals Date Digested Iron	MG/KG	200	03/16/9 <b>4</b> 2560		03/21/94
AIR FORCE TOTAL PETROLEUM HYDROCARBONS Soil TPH Prep Date			03/12/94	E418.1	
Total Petroleum Hydrocarbons	MG/KG	133	2210		03/14/94
ORGANIC ANALYSIS					
AIR FORCE AROMATIC VOLATILE ORGANICS	•			SW8020	
Benzene	MG/KG	5.3	10		03/08/94
Toluene	MG/KG	5.3	21		03/08/94
Ethylbenzene	MG/KG	5.3	24		03/08/94
Xylenes, Total	MG/KG	7.4	72		03/08/94
a,a,a-Trifluorotoluene	PERCENT		94		03/08/94
Instrument ID #			4		03/08/94
Soil Prep Date			3/8/94		03/08/94

# PRELIMINARY: DATA PENDING FINAL REVIEW

March 29, 1994

3/8/94

125

03/08/94

03/08/94

PACE Project Number: 740307502

Mr. Doug Downey

Soil Prep Date

Dilution Factor

Page 2

Client Reference: Eglin AFB

Client Reference: Egilh AFB					
PACE Sample Number: Date Collected:			75 0031655 03/04/94		
Date Received:			03/07/94		
Client Sample ID:			EG2-VMPA-		
Parameter	<u>Units</u>	MDL	39'	METHOD DAT	E ANALYZED
SUBCONTRACT ANALYSIS	•				
INDIVIDUAL PARAMETERS					
Grain Size Distribution Curve			SEE ATTACH		03/16/94
Nitrogen, Total Kjeldahl	mg/kg	43	ND	351.3	03/16/94
Total Phosphate	mg/kg	1.1	29	365.1	03/17/94
INORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS		•			
Alkalinity, Total (As CaCO3)	mg/kg	42	ND	SM403 (M)	03/16/94
Moisture, Percent	PERCENT		7.0	D2216	03/09/94
pu pu	PH UNITS		6.6	SW9045	03/10/94
AIR FORCE FAA IRON				SW7380	
Soil FAA Metals Date Digested			03/16/94		
Iron	MG/KG	20	135		03/21/94
AIR FORCE TOTAL PETROLEUM HYDRUCARBUNS				E418.1	
Soil TPH Prep Date			03/12/94		
Total Petroleum Hydrocarbons	MG/KG	134	3370		03/14/94
ORGANIC ANALYSIS					
AIR FORCE AROMATIC VOLATILE ORGANICS				SW8020	
Benzene	MG/KG	0.067	0.15		03/08/94
Toluene	MG/KG	0.067	0.19		03/08/94
Ethylbenzene	MG/KG	0.067	0.40		03/08/94
Xylenes, Total	MG/KG	0.094	2.5		03/08/94
a,a,a-Trifluorotoluene	PERCENT		79		03/08/94
Instrument ID #	-		4		03/08/94

TO

2-4'

MDL

13038318208 P.04

# PRELIMINARY: DATA PENDING

PACE Project Number: 740307502

METHOD DATE ANALYZED

Mr. Doug Downey Page

Parameter

Client Reference: Eglin AFB

PACE Sample Number: Date Collected:	75 0031663 03/04/94
Date Received:	03/07/94
Client Sample ID:	EG2-VMPB-

SUBCONTRACT ANALYSIS					
INDIVIDUAL PARAMETERS Grain Size Distribution Curve				H ASTM D422	03/16/94
Nitrogen, Total Kjeldahl	mg/kg	43	ND	351.3	03/16/94
Total Phosphate	mg/kg	1.1	15	365.1	03/17/94

Units

INORGANIC ANALYSIS				
INDIVIDUAL PARAMETERS  Alkalinity, Total (As CaCO3)	MG/KG 43	128	SM403 (M)	03/16/94
Moisture, Percent	PERCENT	7.6	D2216	03/09/94
- nu	PH UNITS	7.8	SW9045	03/10/94

AIR FORCE FAA IRON Soil FAA Metals Date Digested Iron	MG/KG	170	03/16/94 2100	SW7380	03/21/94
AIR FORCE TOTAL PETROLEUM HYDROCARBONS Soil TPH Prep Date			03/12/94	E418.1	
Total Petroleum Hydrocarbons	mg/kg	270	6610		03/14/94

ORGANIC ANALYSIS		
AIR FORCE AROMATIC VOLATILE	ORGANICS	SW8020

Benzene	MG/KG	2.7	ND	03/08/94					
Toluene	MG/KG	2.7	ND	03/08/94					
Ethylbenzene	MG/KG	2.7	9.9	03/08/94					
Xylenes, Total	MG/KG	3.8	22	03/08/94					
a,a,a-Trifluorotoluene									
Instrument ID #			4	03/08/94					
Soil Prep Date			3/8/94	03/08/94					
Dilution Factor			5000	03/08/94					

PRELIMINARY:

DATA PENDING

March 29, F19 AL REVIEW

PACE Project Number: 740307502

Mr. Doug Downey Page 4

Client Reference: Eglin AFB

These data have been reviewed and are approved for release.

Kenneth D. Faust, Southern California Regional Director

TO

Mr. Doug Downey Page 5

**FOOTNOTES** 

for pages 1 through

PRELIMINARY:

Client Reference: Eglin AFB

MDL

Method Detection Limit

Not detected at or above the MDL. ND

730307.508

FIGURE B.2

	G. C.	ATTENTION: Mr. DIENAVIE (SACATURE)	PACE LABORATORY	Abusto California 04040	AHRI Stacy Hook Hanting Tox	(415) 883 6100 (Mx) 193-25 65		Markin Reserve	SOIL	BOK.	TICE	tot.	POIL	POR	POIL	POR	POR.	BOIL	HOIL	· · · · · · · · · · · · · · · · · · ·	BOM.	BOIL	80H.	פסור	AND 64.30 EN	+	G - Ocat Gample, G - Composite Bomple	ENGINEERING-SCIENCE, INC. 1700 Brondway, Bulls 200 - Deriver, Colorado	ACMOO
	Bhby Ta:	77	- LL 4	* <	. «			Tempt 1100		30	30	<b>9</b> 0	9	00	00	9	00	90	9 0	<b>0</b>	0	0 0	9	0	Gemeets		9		3
			MONE			(SEA)	4) 5	NCA TER B	7		7		7												Date / These	Onto I There	09.54	GINEER	
RD	Sept.		QJ(	¥.	2 <u> </u>	(X3)	، ب	E SUF	17		>														å,	4 20	3.3	EN(	
CHAIN OF CUSTODY RECORD	Press		HOME			(MOI (TZBO	(A) (II) OB (III) &	CL MA			>		7												(onte	noture)	(DACE)	`	
usro	-							7	- ×		4	1	0												e Laboratory by: (Bignature)				29098310
OF C		878		ر				3:	ì																galony	THE COST IN THE PERSON IN THE		<b>4</b> 1	986
CHAIN		AFCEE GLOVENTING PALOT TEATS	BOOK: EGUN AFB	AN FRIN KYA			A. America		2 / J	10 - MA	176 1001	MIPA - 57		VMPB - 2-7											Recieved	+ + 1/1 000 m/s/c	3-7 ms. 0. W	antes Shipment. Captes to: Caerdinotes Field Files	1622 017836062
		ENGINEERING-SCIENCE, INC.	#71£ 948 0 84384		8	1	800			E63-	7	152		202											(Shankara)			Mad Account	1
		ERING	ADWAY, SH	B	<b>4</b>	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			į	(%)		7930		130											-	M		Otabilluden: Orlg	Abitel thusbor.
		ENGINE	9700 BROADWAY, SLETK 1948 DEBIVER, COLOMADO 86284		DE 268. 43	Sempton (4): (8-10				<b>**</b>		7	-	2/4/4/1/200							1	į			1			O A A A	7

TO

# PRELIMINARY: DATA PENDING FINAL REVIEW

PACE Project Number: 740303502

Engineering-Science, Inc. 1700 Broadway, Suite 900 Denver, CO 80290

Attn: Mr. Doug Downey

Client Reference: Eglin AFB

75 0030756 PACE Sample Number: 03/01/94 Date Collected: 03/03/94 Date Received:

_	Date Received:			EG3-VW-6-8		•
	Parameter	<u>Units</u>	MDL		METHOD DA	ATE ANALYZED
	SUBCONTRACT ANALYSIS			·		
	INDIVIDUAL PARAMETERS					
	Grain Size Distribution Curve			SEE ATTACH		03/16/94
	Nitrogen, Total Kjeldahl	mg/kg	40	ND	351.3	03/16/94
	Total Phosphate	mg/kg	1.1	35	365.1	03/17/94
	INORGANIC ANALYSIS					
	TNDTVTDUAL PARAMETERS					
	Alkalinity, Total (As CaCO3)	MG/KG	43	331	SM403 (M)	03/16/94 '
	Moisture, Percent	PERCENT		6.9	D2216	03/09/94
Į	PH	PH UNITS		8.1	SW9045	03/10/94
_	AIR FORCE FAA IRON				SW7380	
	Soil FAA Metals Date Digested			03/09/94		
	Iron	MG/KG	21	240		03/09/94
	AIR FORCE TOTAL PETROLEUM HYDROCARBONS				E418.1	•
	Soil TPH Prep Date			03/08/94		
	Total Petroleum Hydrocarbons	MG/KG	513	15800		03/08/94
	ORGANIC ANALYSIS					
	AIR FORCE AROMATIC VOLATILE ORGANICS				SW8020	
	Benzene	MG/KG	0.54	ND		03/08/94
و	Toluene	MG/KG	0.54	15		03/08/94
	Ethylbenzene	MG/KG	0.54	3.3		03/08/94
	Xylenes, Total	MG/KG	0.75	26		03/08/94
	a,a,a-Trifluorotoluene	PERCENT		60		03/08/94
	Instrument ID #			4		03/08/94
	Soil Prep Date			3/8/94		03/08/94
	Dilution Factor			1000		03/08/94

PACE Project Number: 740303502

# PRELIMINARY: DATA PENDING FINAL REVIEW March 29, 1994

Mr. Doug Downey

Dilution Factor

Page 2

Client Reference: Eglin AFB

_					
PACE Sample Number:			75 0030764		
Date Collected:			03/02/94		
_ Date Received:			03/03/94		
Client Sample ID:			EG3-MPA-3-		
Parameter	Units	MDL	5	METHOD I	DATE ANALYZED
	<del>4</del>				
SUBCONTRACT ANALYSIS			•		
INDIVIDUAL PARAMETERS					
Grain Size Distribution Curve			SEE ATTACH	ASTM D422	
Nitrogen, Total Kjeldahl	mg/kg į	42	120	351.3	03/16/94
Total Phosphate	mg/kg	1.1	18	365.1	03/17/94
INORGANIC ANALYSIS					
TNDTVTDUAL PARAMETERS					
Alkalinity, Total (As CaCO3)	MG/KG	42	253	SM403 (M)	03/16/94
Moisture, Percent	PERCENT		5.8	D2216	03/09/94
PH	PH UNITS		8.2	SW9015	03/10/94
AIR FORCE FAA IRON				SW7380	
Soil FAA Metals Date Digested			03/09/94		
Iron	MG/KG	40	620		03/09/94
AIR FORCE TOTAL PETROLEUM HYDROCARBONS				E418.1	
Soil TPH Prep Date			03/08/94		
Total Petroleum Hydrocarbons	MG/KG	490	12100		03/08/94
ORGANIC ANALYSIS					
AIR FORCE AROMATIC VOLATILE ORGANICS		٠	,	SW8020	
Benzene	MG/KG	2.6	ND		03/08/94
Toluene	MG/KG	2.6	22		03/08/94
Ethylbenzene	MG/KG	2.6	14		03/08/94
Xylenes, Total	MG/KG	3.7	88		03/08/94
a,a,a-Trifluorotoluene	PERCENT		88		03/08/94
Instrument ID #			4		03/08/94
Soil Prep Date			3/8/94		03/08/94
Dilahian Harras			E000		02 (02 (24

5000

03/08/94

March 29, 1994

TO

# PRELIMINARY: DATA PENDING FINAL REVIEW

PACE Project Number: 740303502

Mr. Doug Downey

Page 3

Client Reference: Eglin AFB

PACE Sample Number: Date Collected: Date Received: Client Sample ID: Parameter	<u>Units</u>	MDL	75 0030772 03/02/94 03/03/94 EG3-MPB-5	METHOD DAT	e analyzed
SUBCONTRACT ANALYSIS					
INDIVIDUAL PARAMETERS Grain Size Distribution Curve Nitrogen, Total Kjeldahl Total Phosphate	mg/kg mg/kg	43 1.1	SEE ATTACH 83 46	ASTM D422 351.3 365.1	03/16/94 03/16/94 03/17/94
INORGANIC ANALYSIS					
INDIVIDUAL PAPAMETERS Alkalinity, Total (As CaCO3) Moisture, Percent ph	MG/KG PERCENT PH UNITS	43	321 7.1 8.2	SM403 (M) D2216 SW9045	03/16/94 03/09/94 03/10/94
AIR FORCE FAA IRON Soil FAA Mctals Date Digested Iron	mg/kg	81	03/09/9 <b>4</b> 1160	SW7380	03/09/94
AIR FORCE TOTAL PETROLEUM HYDROCARBONS Soil TPH Prep Date Total Petroleum Hydrocarbons	mg/kg	10.6	03/08/94 848	E418.1	03/08/94
ORGANIC ANALYSIS			·		
AIR FORCE AROMATIC VOLATILE ORGANICS Benzene Toluene Ethylbenzene Xylenes, Total a,a,a-Trifluorotoluene Instrument ID #	MG/KG MG/KG MG/KG MG/KG PERCENT	2.7 2.7 2.7 3.8	ND 5.1 4.5 29 91	SW8020	03/08/94 03/08/94 03/08/94 03/08/94 03/08/94
Soil Prep Date Dilution Factor			3/8/94 5000		03/08/94 03/08/94

PRELIMINARY: DATA PENDING March 29, FINAL REVIEW PACE Project Number: 740303502

Mr. Doug Downey
Page 4

Client Reference: Eglin AFB

These data have been reviewed and are approved for release.

Kenneth D. Faust, Southern California Regional Director

TO

13038318208 P.12

PRELIMINARY: DATA PENDING
March 29, PACE Project Number REVER 1992

Mr. Doug Downey

Page 5

FOOTNOTES

for pages 1 through 4

Client Reference: Eglin AFB

MDL

Method Detection Limit

ND Not detected at or above the MDL.

TO

FIGURE B.2 CHAIN OF CUSTODY RECORD

740303.507

MENTION: Mc. Marie Quercion AHM. Stady Moch Hunfingfond ReacH 41-Digital Drive 5702 bolsa AV. 5951-618 (ML) (415) 883-6100 CA <u>え</u> Romertee Novato, California 94949 PACE LABORATORY es o 1700 Breadway, Butte 600 - Degrad. Colorado (303) 631-8160 ENGINEERING-SCIENCE, INC. 3-3 10940 0-0mb tempte, 0-Comp Remorter REDO 9 톃 **1** 8 를 뎧 ᅙ 뎧 ಕ್ಷ 8 を発 ğ 절 ğ **6**0F 夏 90 0 9 **9** 9 <u>မ</u> 0 O ප ප () () **a** 9 <del>မ</del> 0 0 0 7-5 1900 NOO! (SEPTE) Detty / Three AD ME 1 388 J COLL 5 148 B CLON S FUTI 7 COS MB SAN BYE 0864 MB NORD **XON** (AZIA) 7 adequal less Laborationy by: (Bigmalure) 1705 MS 3.5 2.5 ony by: (64g M) N w AFCEE BNOVENTWAN PILOT YESTS des Fredd Filter ナス Fed 2/4/94 CONTAINDSP BOLIN AFR on: HURLBURY 260 and Couples to 1 Coup Beaughe Desembilion MPA-3-5 E63-VW-6-8 3. ら ANOSIKA 9000 2 ROB DATEN C. ENGBREERING-SCIENCE, INC. DEC BO ١ 11A FED E63. Net-Mades Orlgins Access E63 Performat Expresse (Sportboot) BLA s the broadway, eastly pod derne a, colorado setto DE268. 43:4608 000 Abt Michaelor: WARE 080 0630 1/40 Baragharfait: P 954 4 104-034 ES Joh Pa Broko N 59/10 į



5702 Bolsa Avenue Huntington Beach, CA 92649 TEL: 714 892-2565 FAX: 714 890-4032

# Fax Transmittal Cover Sheet

	3-29-94		
То	OLA AWOSIICA	At: ENGINEE	ring subvice
Fax #	: (404) 235 - 25	<u> </u>	terren and the state of the sta
Total # of Pages	s (Including This Cove	er): 8 25	
PACE Project N	o./Department#		
Comments	: 740303502	EGLIN	AFB
	740307502	, J <b>ć</b>	ţ:
If you have que	estions regarding this	s fax transmission	, please
Contact:	Marie Concepción	Phone:(71	4) 892-2565
Response Real	ested? Yes	No	
•			

FRELIMINARY: DATA PENDING FINAL REVIEW

Engineering-Science, Inc. 1700 Broadway, Suite 900

PACE Project Number: 740303502

Denver, CO 80290

Attn: Mr. Doug Downey

Client Reference: Eglin AFB

PACE Sample Number: Date Collected: Date Received:

75 0030756 03/01/94 03/03/94 EG3-VW-6-8

Parameter	Units	MDL		METHOD DA	re analyzed
SUBCONTRACT ANALYSIS			•		
INDIVIDUAL PARAMETERS					
Grain Size Distribution Curve	•-		SEE ATTACE		03/16/94
Nitrogen, Total Kjeldahl	mg/kg	40	MD	351.3	03/16/94
Total Phosphate	mg/kg	1.1	35	365.1	03/17/94
INORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Alkalinity, Total (As CaCO3)	mg/kg	43	331	SM403 (M)	03/16/94
Moisture, Percent	PERCENT		6.9	D2216	03/09/94
PH	PH UNITS	•	8.1	S#9045	U3/10/94
AIR FORCE FAA IRON				SW7380	
Soil FAA Metals Dato Digosted			03/09/94		
Iron	MG/KG	21	240		03/09/94
AIR FORCE TOTAL PETROLEUM HYDROCARBONS			•	B418.1	
Soil TPH Prep Date			03/08/94		
Total Petroleum Hydrocarbons	Mg/Kg	513	15800		03/08/94
ORGANIC ANALYSIS					
AIR FORCE AROMATIC VOLATILE OKGANICS				SW8020	•
Benzene	MG/KG	0.54	ND		03/08/94
Toluene	MG/KG	0.54	15		03/08/94
Ethylbenzene	MG/KG	0.54	3.3		03/08/94
Xylenes, Total	MG/KG	0.75	26		03/08/94
a,a,a-Trifluorotoluene	PERCENT		<b>6</b> 0 .		03/08/94
Instrument ID #			4		03/08/94
Soil Prep Date			3/8/94		03/08/94
Dilution Factor			1000		03/08/94

# PRELIMINARY: DATA PENDING March 29, FINAL REVIEW

PACE Project Number: 740303502

Mr. Doug Downey Page 2

PACE Sample Number: Date Collected: Date Received: Client Sample ID: Parameter	<u> Units</u>	MDL.	75 0030764 03/02/94 03/03/94 EG3-MPA-3-	METHOD DAT	TE ANALYZED
SUBCONTRACT ANALYSIS					
INDIVIDUAL PARAMETERS Grain Size Distribution Curve Nitrogen, Total Kjeldahl Total Phosphate	mg/kg mg/kg	<b>42</b> 1.1	SEE ATTACH 120 18	ASTM D422 351.3 365.1	03/16/94 03/16/94 03/17/94
INORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS Alkalinity, Total (As CaCO3) Moisture, Percent pH	MG/RG PERCENT PE UNITS	42	253 5.8 0.2	SM403 (M) D2216 SW9045	03/16/94 03/09/94 03/10/94
AIR FORCE FAA IRON Soil FAA Metals Date Digested			03/09/94	SW7380	
Iron	MG/KG	40	620		03/09/94
AIR FORCE TOTAL PETROLEUM HYDROCARBORS Soil TPH Prap Date Total Petroleum Hydrocarbons	mg/kg	490	<b>03/08/94</b> 12100	E418.1	03/08/94
ORGANIC ANALYSIS					
AIR FORCE AROMATIC VOLATILE ORGANICS				SW8020	
Benzene	mg/kg	2.6	ND		03/08/94
Toluene	MG/KG	2.6	22		03/08/94
Ethylbenzenc	MG/KG	2.6	14		03/08/94
Xylenes, Total	MG/KG	3.7	88		03/08/94
a, a, a-Trifluorotoluene	PERCENT		88		03/08/94
Instrument ID #			4		03/08/94
Soil Prep Date			3/8/94		03/08/94
Dilution Factor			5000		03/08/94

#### PRELIMINARY: DATA PENDING FINAL REVIEW

Mr. Doug Downey Page 3 March 29, 1994

PACE Project Number: 740303502

PACE Sample Number: Date Collected: Date Received: Client Sample ID: Parameter	<u>Unit</u>	MOI	75 0030772 03/02/94 03/03/94 EG3-MPB-5	METHOD DA	TE ANALYZED
SUBCONTRACT ANALYSIS					
INDIVI <b>DUAL PARAMETERS</b> Grain Size Distribution Curve Nitrogen, Total Kjeldahl Total Phosphate	mg/kg mg/kg	43 . 1,1	SER ATTACH 83 46	ASTM D423 351.3 365.1	03/16/94 03/16/94 03/17/94
INORGANIC ANALYSIS					
INDIV <b>IDUAL PARAMETE</b> RS Alkalinity, Total (As CaCO3) Moisture, Percent pH	MG/KG PERCENT DH UNITS	43	321 7.1 0.2	SM403 (M) D2216 SW9045	03/16/94 03/09/94 U3/10/94
AIR FORCE FAA IRON Soil FAA Metals Date Digested Iron	mg/kg	81	03/09/94	SW7380	<b></b>
AIR FORCE TOTAL PETROLEUM HYDROCARBONS Soil TPH Prep Date Total Petroleum Hydrocarbons	MG/KG	10.6	03/08/94 848	E418.1	03/09/94
ORGANIC ANALYSIS					-, · -, - <del>-</del>
ATR FORCE AROMATIC VOLATILE ORGANICS Benzele	MG/KG	2.7	ND	SW8020	09/05/
Toluene	MG/KG	2.7	5.1		03/08/94
Ethylbenzeno	MG/KG	2.7	3.1 4.5		03/08/94 03/08/94
Xylenes, Total	MG/KG	3.8	29		03/08/94
a,a,a-Trifluorotoluena	PERCENT		91		03/08/94
Instrument ID #			4		03/08/94
Soil Frep Date			3/8/94		03/09/94
Dilution Factor			5000		03/08/94

PRELIMINARY:
DATA PENDING
March 29, FINAL REVIEW
PACE Project Number: 740303502

Mr. Doug Downey Page 4

Client Reference: Eglin AFB

These data have been reviewed and are approved for release.

Kenneth D. Faust, Southern California Regional Director

TO

PRELIMINARY:
DATA PENDING
March 29, MALLEREVIEW02

Mr. Doug Downey
Page 5

FOOTNOTES

for pages 1 through 4

Client Reference: Eglin AFB

MDL

Method Detection Limit

ND

Not detected at or above the MDL.

#### SEQUOIA ANALYTICAL LABORATORY

Particle Size Distribution by Sieve and Hydropaster

Method: ASTN D422-63

Analyzed: 3/16/94

Lab ID: 9403823-01

Client ID: EG3-VW-6-8

SIEVE TEST

A. Total weight of sample:

B. Weight retained in No.10 sieve:

C. % passing No.10 sleve:

179.03 g 0 g 100.00 %

g Gample Description: 90iL

Sieve test for weight retained in a No.10 slave.

	WEIGHT	*	CUMULATIVE	CUMULATIVE
SIEAE SISE	METAINED(a)	RETAINED	% FETAINED	> PASSING
1 1/2 in	0.00	0.00	0.00	100,00
3/8 in	0.00	9.00	0.00	100.00
No. 4	0.00	0.00	0.00	100.00
No. 10	0.00	0.00	0.00	190,00
No. 200	171.03	94.53	95.50	4,47

#### HYDROMETER TEST

ELAPSED	TEMP.	HYDROMETER	CORRECTED		PARTICLE
TIME (min)	(deg Ç)	READING (H)	REALING (F)	<u>(U</u>	MANN, By rears (89)
ż	20	14	10	14.7	0.0870
8	20	14	10	14.7	0.0284
10	20	8	4	15.6	0.0170
15	20	-8	4	15,6	0.0139
25	20	7	а	158	0.0109
40	20	7	3	15.8	0.0086
80	20	7	3	15.8	0.0070
90	50	7	3	15.8	0.0087
120	20	7	3	15.5	0.0050
1440	20	7	3	15.8	0.0014

% SUSPENDED
(*)
8.7
8.7
3.5
3.5
2.6
2.6
2.6
2.6
2.6
9.0

Weight of soil used in hydrometer test (D):

Hydressepio moisture correction (autor (G):

Specific gravity (Assumed):

Disparsing agent correction factor (E):

Meniscus correction factor (F):

Temp./Spec, gravity dependent constant (K):

	_
115	_
1	_
2.65	
3	_
1	
0.01365	

Formulae:

A = H - E - F

9 = K[BCRT(L/T)]

P = (R/W)100

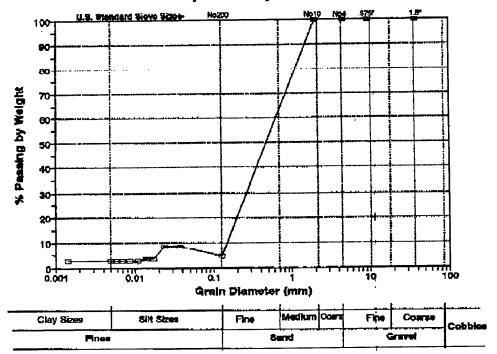
W = (1x 100)/C

Jepaq

In John

Mathod: A8TM D422-63 Analyzed: 2/16/94 Lab ID: 9403623-01

## **Graph of Acquired Data**



Graphing Data:					
Part. Diam.	Parcent				
(mm)	Suspended				
37.5	100.00				
9.5	100,00				
4.5	100.00				
2	190,00				
0.127	4.47				
0.0370	8.70				
0.0234	8.70				
0.0170	3.49				
0.0139	5.48				
0.0109	2.61				
0.0000	2.51				
0.0070	2.61				
0.0057	2.61				
0.0050	<b>2.6</b> 1				
0.0014	2.61				

Sample Composition:		
(1) Gravel, passing 3-in. and		
retained on No. 4 sieve	0.0	*
(2) Send, passing No. 4 sieve and		
retained on No. 200 sleve	95.5	%
(3) Sift size, 0.074 to 0.005 mm	1.9	*
(4) Clay alze, smaller than 0.005 mm	2.6	<b>%</b>

## SEQUOIA ANALYTICAL LABORATORY

Particle Size Distribution by Slave and Hydrospeter

Method: ASTM D422-63

Amalyzed: 3/16/94

Lab 10: 9403623-02

Chert ID: EG3-MPA-3-5

SIEVE TEST

A. Total weight of sample:

B. Weight rateined in No.10 slave:

0.47 99.64 %

129.18

Sample Description: 90il.

C. % passing No.10 sieve:

Sleve test for weight retained in a No.10 sleve.

			Company of the Compan	
	WEIGHT	%	CUMULATIVE	CUMULATIVE
OFFICE CISE	METAINED(g)	PETAINED	n retained	K 989834G
1 1/2 h	0.00	0.00	0.00	100.00
3/8 in	0.00	0.00	0.00	100.00
No. 4	0.00	0.00	0.00	100.00
No. 10	0.47	0.36	0.36	99.04
No. 200	113.57	87.92	\$8.28	11.72

#### HYDROMETER TEST

ELAPSED	темР.	HYDROMETER	CORRECTED	en en servicio percentra de la composición del composición de la composición del composición de la composición de la composición de la composición del composición de la composición del composición del composici	PARTICLE
TIME (min)	(deg C)	READING (H)	HEAUTHY (H)	L C	F) 45 4.EAP?
2	20	18	14	14	0.0361
4	20	17	13	14.2	0.0230
10	20	15	11	14.5	0.0164
18	20	14	10	14.7	0.0138
25	20	13	R	14.8	11.0105
40	20	12	8	15	0.0084
90	20	11	7	15.2	0.0069
80	20	11	7	15.2	0.0056
120	20	10	6	15.3	0.0049
1440	20	8	- 4	15.6	0.0014

% SUSPENDED
(P)
12.1
11.3
9.5
8.7
7.8
8.9
6.1
6.1
5.2
3.5

Weight of soil used in hydrometer test (D):

Hydrosoopic moisture correction factor (G):

Specific gravity (Assumed):

Dispersing agent correction factor (E):

Menicous correction factor (F):

Temp./Spec. gravity dependent constant (K):

0.01365

Formulas:

四日號-医-戸

 $\mathbf{S} = \mathbf{K}[\mathbf{SQMT}(\mathbf{L}/T)]$ 

P = (\$1/67)100

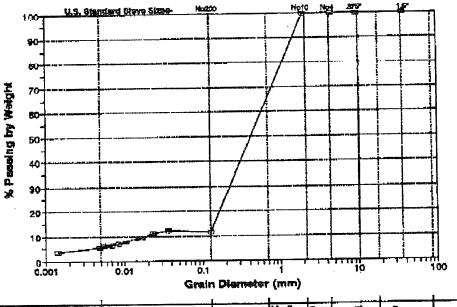
W = (J x 199)/C

J = D x G

Jan Joule

Method: ASTM D422-63 Analyzad: 3/16/94 Lab ID: 9403823-02

#### Graph of Acquired Data



Clay Sizes	Sät Sizes	Fine	Medium	Coar	Fine	Coarse	Cobbles
Fines		84	and .	-	9	i i sa ce	

_		
	Graphir	ig Deta:
l	Part. Diam.	Percent
	(mm)	Suspended
1	97.5	100.00
	9.5	100.00
	4.5	100.00
1	2	99.64
ļ	0.127	11.72
Ì	0.0361	12.13
ı	0.0230	11.26
	0.0164	9.53
	0.0135	8.66
	0,0105	7.80
	0.0084	6.93
	0.0069	5.06
	0.0056	8,06
	0.0049	5.20
	0.0014	3.47

Sample Composition:		
(1) Gravel, passing 9-in. and		
relained on No. 4 sieve	0.0	%
(2) Sand, passing No. 4 sieve and		
retained on No. 200 sieve	88.8	<b>%</b>
(3) Sitt sizes, 0.074 to 0.005 mm	6.5	%
(4) Clay size, smaller than 0.005 mm	5.2	%

# SEQUOIA ANALYTICAL LABORATORY

Particle Size Distribution by Sleve and Hydrometer

Method: ASTM D422-63

Analyzed: 3/16/94

Sample Description: 90ft.

Lab ID: 9402623-03

Client ID: EG3-MPB-5

SIEVE TEST

A. Total weight of eample:

B. Weight retained in No.10 sleve:

C. % passing No.10 eleve:

245.94	g
0.1	8
99.96	%

Slave test for weight retained in a No.10 serve.

	WEIGHT	*	CUMULATIVE	CUMULATIVE
SIEVE SIZE	RETAINED(g)	RETAINEU	* HETAINED	% PASSING
1 1/2 in	0.00	0.00	0.00	100.00
3/8 in	0.00	0.00	0.00	100.00
No. 4	0.90	0.00	0.00	100.00
No. 10	0.10	0.04	0.04	90.08
No. 200	221.19	89.84	89.98	10.02

#### HYDROMETER TEST

		4 1 2 4 5 5	The professional agency frequency and an extension	para territoria de como en material e chambian esta a un	mail Was part to Co.
ELAPSED	тымР.	HYDROMETER	CORRECTED		PARTICLE
TIME (men)	(deg C)	HEADING (H)	KEADING (P)	<u>(</u> 2	CRANL IN YEST (R)
2	20	17	18	14.2	0.0384
5	20	17	13	14.2	0.0230
10	20	15	11	14.5	0.0164
15	20	14	10	14.7	0.0138
25	20	13		14.8	0.0195
40	80	12	8	15	0.0084
60	20	12	8	15	0.0068
90	20	11	7	15.2	0.0056
120	20	10	6	15.3	0.0049
1440	20		4	15.8	0.0014

% SUSPENDED
(P)
11.3
11.3
8.6
8.7
7.8
7.0
7.0
6.1
5.2
3.8

Weight of soil used in hydrometer test (D):

Hydroscopic moisture correction factor (G):

Specific gravity (Assumed):

Dispersing agent correction factor (E):

Meniscus correction factor (F):

Temp./Spec. gravity dependent constant (K):

	115	ķ
	1	
	2.65	
	3	
	1	١
0.0	01385	١

Formuses:

R=H.E.F

B = K[SCRT(L/T)]

P = (PR/987)100

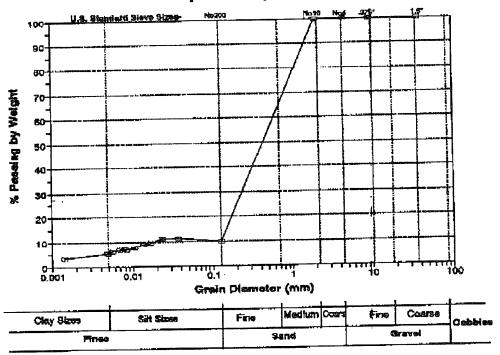
 $W = (J \times 100)/C$ 

J=PrG

Method: ASTM D422-63 Analyzed: 3/18/84 Lab ID: 9403623-03

TO

## Graph of Acquired Data



Section (Section)	g Data:
Part. Dism.	Percent
(mm)	Suspended
37.5	100.00
9.5	100.00
4.5	100,00
2	99.98
0.127	10.02
0.0364	11.30
0.0230	11.30
0.0164	9.56
0.0135	3.89
0.0105	7.82
0.0084	6,95
0.0058	6.85
0.0056	6.08
0.0049	5.22
0.0014	3.48

		and the state of t
Sample Composition:		
(1) Gravel, pessing 3-in. and		
retained on No. 4 sieve	0.0	<b>%</b>
(2) Sand, passing No. 4 sieve and		
natained on No. 200 steres	90.0	%
(3) Silt size, 0.074 to 0.005 mm	4.8	<b>%</b>
(4) Clay size, smaller than 0.005 mm	5.2	<b>%</b>
·		The second se

FIGURE B-2

740303.502 CHAIN OF CUSTODY RECORD

MENTON: Me. MERNE CHESCIONS Novator California 94949 Alm: Clasy Hook Haymon lend 44-Dhylial Drive 5702 Bolse Av. 2951-128 Because AZO @ 30 C GW (415) 883-5100 CX 3-3 OFFC 4. 4. 4. 4 Secretary 6. Composite Comparison Separate Separate PACE LABORATORY 1788 Becedany, Butto 868 - Berrer, Cebouda (1831 231-2169 engineening-science, inc (7/K) 2 CON. 8 200 ğ 3 <u>\$</u> 2 켥 100 2 49 4 9 **a** 9 4 **6 8** 4 9 9 0 40 ජ ජ **43** © 69 3-2 1980 **स्ट**्रा हड्ड 🏻 Date of Date (SEALS) 素な新 الدادوي e est y 1819 3 DE TA CHOM 977 ABI OCEL MS1 (MONE) おなっ Series (Algorithm) Beeferrah fer Laket alany byt (Bigertian) COP V (ANIA) THE IAS (PPI) Sec. of Contra **~**\$\ U Ad. ercee exceeding froi tests mant. Capter by Constructor Rotal Fibra かな でら 3/7/946 CONTAINISP ROLIN AFB THE HARTBORY 3-3 000 John How () () Complete Country des E63 - MPA-3-5 00 V) ANOSKA 3 **UNITED IN** E63. MOB designed Carlot Z Z, QX/280 ENGINEERING-SCIENCE, SAC-AA FED State Mathematican Only has described 663 Fortatel Euperan Stranbart. 3 o pro Caracapara, Garres des Deince de Caracapara Cous Societo a ped DE200. 45:4/20 IN JOSEPH SO BOOK 080 05/0 18/co/co Company (4) (94) 03/1/1/10/69 とおの上の日 とりたり

# PRELIMINARY: DATA PENDING FINAL REVIEW

PACE Project Number: 740307502

Engineering-Science, Inc. 1700 Broadway, Suite 900 Denver, CO 80290

Attn: Mr. Doug Downey

PACE Sample Number:			75 0031647		
Date Collected:			03/03/94		
Date Received:			03/07/94		
Client Sample ID:			EG2-VW-3'		
Parameter	Units	MDL		METHOD DAT	E ANALYZED
COMPANIE COM					
SUBCONTRACT ANALYSIS					
INDIVIDUAL PARAMETERS				- ema 7100	03/16/94
Grain Size Distribution Curve			SEE ATTACH		03/16/94
Nitrogen, Total Kjeldahl	mg/kg	43	ND	351.3	03/17/94
Total Phosphate	mg/kg	1.1	28	365.1	03/11/·24
INORGANIC ANALYSIS					
INORGANIC ANADIOLO					
INDIVIDUAL PARAMETERS	•		***	SM403 (M)	03/16/94
Alkalinity, Total (As CaCO3)	MG/KG	42	354 6.0	D2216	03/09/94
Moisture, Percent	PERCENT		5.0 5.2	2W9045	03/10/94
рн	PH UNITS		6.4	243043	05,20,55
ATT TOTAL TRANS	÷			SW7380	
AIR FORCE FAA IRON			03/16/94		
Soil FAA Metals Date Digested	mg/kg	200	2560		03/21/94
Iron	111, 111				
AIR FORCE TOTAL PETROLEUM HYDROCARBONS				E418.1	
Soil TPH Prep Date			03/12/94		
Total Petroleum Hydrocarbons	mg/kg	133	2210		03/14/94
•			•		
ORGANIC ANALYSIS					
AIR FORCE AROMATIC VOLATILE ORGANICS	•			SW8020	
Benzene	MG/KG	5.3	10		03/08/94
Toluene	mg/kg	5.3	21		03/08/94
Ethylbenzene	MG/KG	5.3	24		03/08/94
Xylenes, Total	MG/KG	7.4	72		03/08/94
a,a,a-Trifluorotoluene	PERCENT		94		03/08/94
Instrument ID #			4		03/08/94
A. 12			3/8/94		03/08/94
Soil Frep Date			10000		03/08/94
Dilution Factor			****		

TO

### PRELIMINARY: DATA PENDING FINAL REVIEW

March 29, 1994

PACE Project Number: 740307502

SW8020

Mr. Doug Downay Page 2

PACE Sample Number: Date Collected: Date Received: Client Sample ID: Parameter	<u>Units</u>	WDL	75 0031655 03/04/94 03/07/94 EG2-VMPA- 39'	MBTHOD I	DATE ANALYZED
SUDCONTRACT ANALYSIS					
INDIVIDUAL PARAMETERS Grain Size Distribution Curve Nitrogen, Total Kjeldahl Total Phosphate INORGANIC ANALYSIS	mg/kg mg/kg	43 1.1	SEE ATTACH ND 29	ASTM D423 351.3 365.1	03/16/94 03/16/94 03/17/94
INDIVIDUAL PARAMETERS Alkalinity, Total (As CaCO3) Moisture, Percent pH	MG/KG PERCENT PE UNITS	42	NID 7.0 6.6	SM403 (M) D2216 SW9045	03/16/94 03/09/94 03/10/94
AIR FORCE FAA IRON Soil FAA Metais Date Digested Iron	MG/KG	20	03/16/94 135	9W7380	03/21/94
AIR FORCE TOTAL PETROLEUM HYDROCARBONS Soil TPH Prep Date Total Petroleum Hydrocarbons	mg/kg	134	03/12/94 3370	E418.1	03/14/94

ORGANIC	ANALYSIS

AIR FORCE AROMATIC VOLATILE ORGANICS				S78020	
Benzene Toluene Ethylbenzene Xylenes, Total a,a,a-Trifluorotoluene Instrument ID #	MG/KG MG/KG MG/KG MG/KG PBRCENT	0.067 0.067 0.067 0.094	0.15 0.19 0.40 2.5 79		03/08/94 03/08/94 03/08/94 03/08/94 03/08/94
Soil Prep Date Dilution Factor			3/8/94 125		03/08/94 03/08/94

TO

# PRELIMINARY: DATA PENDING

PACE Project Number: 740307502

Mr. Doug Downey Page

<del>-</del>					
PACE Sample Number:			75 0031663		
Date Collected:			03/04/94		
Date Received:			03/07/94		
Client Sample ID:			eg2 - VMPB -		
Parameter	Units	MDL	2-4'	METHOD DAT	E ANALYZED
E OF WIND A PT		:			
SUBCONTRACT ANALYSIS					
INDIVIDUAL PARAMETERS					(- 4 (
Grain Sise Distribution Curve			SEE ATTACH		03/16/94
Nitrogen, Total Kjeldahl	mg/kg	43	ND	351.3	03/16/94
Total Phosphate	mg/kg	1.1	15	365.1	03/17/94
INORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Alkalinity, Total (As CaCO3)	MG/KG	43	128	SM403 (M)	03/16/94
Moisture, Percent	PERCENT		7.6	D2216	03/09/94
pH	PH UNITS		7.8	\$W9045	03/10/94
•					
AIR FORCE FAA IRON				SW7380	
Soil FAA Metals Date Digested			03/16/94		02 (02 (04
Iron	MG/KG	170	2100		03/21/94
				K418.1	
AIR FORCE TOTAL PETROLEUM HYDROCARBONS			03/12/94	#4 2 m A 1 m	
Soil TPH Prep Date	MG/KG	270	6610		03/14/94
Total Petroleum Hydrocarbons	1837 K/3	2,0	0010		
ORGANIC ANALYSIS					
AIR FORCE AROMATIC VOLATILE ORGANICS				SW8020	
Benzene	MG/KG	2.7	ND		03/08/94
Toluene	MG/KG	2.7	ИD		03/08/94
Ethylbenzene	MG/KG	2.7	9.9		03/08/94
Xylenes, Total	mg/kg	3.8	22		03/08/94
a,a,a-Trifluorotoluene	PERCENT		92		03/08/94
Instrument ID #			4		03/08/94
Coil Dwan Dato			3/8/94		03/08/94
Soil Prep Date Dilution Factor			5000		03/08/94
DITUCION tantot			5000		11

PRELIMINARY:
DATA PENDING
March 29, FishAL REVIEW
PACE Project Number: 740307502

Mr. Doug Downey
Page 4

Client Reference: Eglin AFB

These data have been reviewed and are approved for release.

Kenneth D. Faust, Southern California Regional Director

TO

PRELIMINARY: March 29, 1994 A PENDING PACE Projecti NAMER REVIEW

Mr. Doug Downey

Page 5

POOTNOTES 1 through for pages

Client Reference: Eglin AFB

MDLND

Method Detection Limit

Not detected at or above the MDL.

# SEQUOIA ANALYTICAL LABORATORY

Particle Size Distribution by Sieve and Hydrometer

Method: ASTM D622-63

Analyzed: 5/16/94

Sample Description: SOIL

Lab ID: 9403626-01

Client ID: EG2-VW-31

SIEVE TEST

A. Total weight of sample:

B. Weight retained in No.10 sieve:

C. % passing No.10 sleve:

212.91 2.35

98.90 %

Sieve test for weight retained in a No.10 sieve.

	WEGHT	*	CHANTAINE	CUMULATIVE
SHEVE BIZE	RETAINED(g)	RETAINS	% NETAINED	<b>н</b> раззінс
1 1/2 in	0.00	0.00	0.00	100.00
3/6 in	0.00	0,00	0.00	100.00
No. 4	0.28	0.12	0.12	99.88
No. 10	2.09	0.98	1.10	98.90
No. žuu	193.33	<del>\$</del> 0.50	81.91	8.08

#### HYDROMETER TEST

ELAPSED	TEMP.	НҮОВОМЕТЕН			PARTICLE
TIME (mặn)	(Deg (S)	READING (H)	READING (R)	(L)	(DAX. h ross (G)
2	20	15	11	14.5	0.0368
5	20	14	10	14.7	0.0254
10	20	13	9	14.8	0.0188
15	20	13	. 9	14.5	0.0188
25	20	12	0	15	0.0106
40	20	12	8	15	0.0084
60	20	12	В	15	0.0068
90	20	12	8	15	0.0068
120	20	11	7	15.2	0.0049
1440	20	10	8	15.2	0.0014

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
% SUSPENDED	į
(F)	
9.5	l
9.6	
7.7	J
7.7	
6.0	-
6.9	
0.9	
6.9	
6.0	
5.2	

Weight of soil used in hydrometer test (D):

Hydroscopic moisture correction factor (G):

Specific gravity (Assumed):

Dispersing agent correction factor (F)\*

Meniscus correction factor (F):

Temp./Spec. gravity dependent constant (K):

115	7
113	i
1	Ì
2.65	ł
3	l
1	Į
0.01365	l

Formulas:

R = H - E - F s = K[scatt(L/T)]

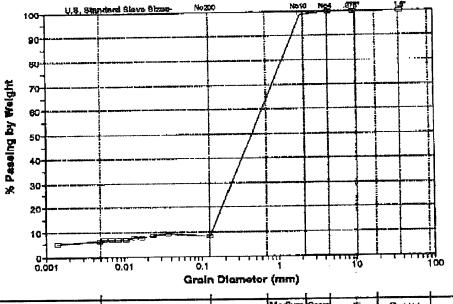
P = (P/W)100

₩ ≒ (J x 100)/©

 $J = D \times G$ 

Method: ABTM D422-63 Analyzed: 3/16/94 Lab ID: 9408628-01

### **Graph of Acquired Data**



Clay Stres	Sint Sizes	Fine	Medium	Coers	Cotatale	Cobbles
Pines			Band		 pravel	

Graphir	ig Data:
Part. Diam.	Percent
(mpa)	Suspended
37.5	100.00
9.5	100.00
4.5	99.88
5	98.90
0.127	8.09
0.0308	9.46
0.0234	<b>6.60</b>
0.0166	7.74
0.0138	7.74
0.0106	5.68
0.0084	6.88
0.0068	6.88
0.0056	6.88
0.0049	6.02
0.0014	5.16

Sample Composition:	#29+53490EPEY90FF+96	****
(1) Gravel, passing 3-in, and		
retained on No. 4 sieve	0.1	<b>.</b> %
(2) Send, pasting No. 4 sieve and		
retained on No. 200 slave	91.8	%
(3) Silt size, 0.074 to 0.005 mm	8.1	<b>%</b>
(4) Clay size, smaller than 0.005 mm	6.0	%

#### SEQUOIA ANALYTICAL LABORATORY

Particle Size Distribution by Sieve and Hydrometer

Method: ASTM D422-83

Analyzed: 3/16/94

Sample Description: SOIL

Lab ID: 9403626-02

Client ID: EG2-VMPA-39

SIEVE TEST

A. Total weight of sample:

B. Weight retained in No.10 sieve:

C. % passing No.10 sieve:

230.58 g 0.09 g

99.96 %

Slove test for weight retained in a No.10 sleve.

	WEKSHT	%	CHIRTHATIVE	CUMULATIVE
SHEVE SIZE	RETAINED(#)	PETARUED	% HETAINED	% PASSING
1 1/2 kg	0.00	0.00	0.00	100.00
3/8 in	0.00	(I.OC)	0.00	100.00
No. 4	0.00	0.00	0.00	100.00
No. 10	0.09	0.04	0.04	99.96
No. 200	221.56	92.48	92.52	7.48

#### HYDROMETER TEST

Sections, examples	on the charge and the		general consumption	one and the second second	
ELAPSED	TEMP.	HYDROMETER	CORRECTED		PARTICLE
Tible (min)	(deg 🗘	READING (H)	READING (R)	(1)	PALES, Ja. 1000 (19)
2	20	14	10	14.7	0.0870
8	20	8	S	15.5	0.0240
10	20	9	6	15.5	0.0170
15	20	9	. R	15.5	0.0189
25	20	9	5	15.5	0.0107
40	20	9	5	15.5	0.0088
50	20	8	4	15.6	0.0070
90	20	8	4	15.8	0.0087
120	20	5	4	15.6	0.0049
1440	20	7	8	15.8	0.0014

% SUSPENDED
(P)
8.7
4.3
4.3
4.3
4.3
4.8
3.5
3,5
3.5
2.8

Weight of soil used in hydrometer test (D):

Hydrassopic moisture currection factor (G):

Specific gravity (Assumed):

Dispersing agent correction factor (E):

Maniscus correction factor (F):

Temp /Spec. gravity dependent constant (N):

115 g 2.65 3

0.01365

Formulas:

日本門-三-門

S = KUSCRT(L/T)]

P = (R/W)190

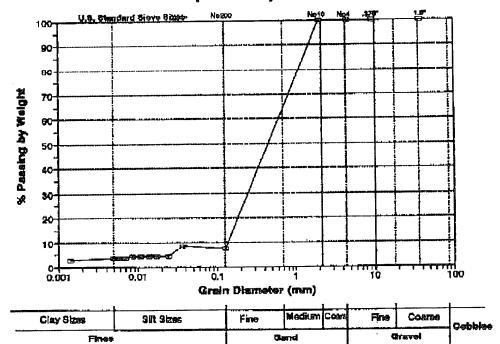
W = (J x 100)/C

J = DxG

Jon John

Method: ASTN D422-83 Analyzed: 3/16/94 Lab ID: 9403626-02

### Graph of Acquired Data



Graphing Data:					
Part. Diam.	Percent				
{mm}	Snabouqed				
97.5	100.00				
9.5	100,00				
4.5	100.00				
<u>a</u> ,	. 99.98				
0.127	7.48				
0.0370	8.69				
0.0240	4.35				
0.0170	4.36				
0.0139	4.35				
0.0107	4.95				
0.0085	4.35				
0.0070	8.46				
0.0087	8.48				
0.0049	3.48				
0.0014	2.61				

0.0	*
0.0	<b>*</b>
0.0	*
0.0	*
0.0	. ;
0.0	<b>%</b>
92.5	%
4.0	<b>_%</b>
3.5	%
	4.0

#### SEQUOIA ANALYTICAL LABORATORY

Particle Size Distribution by Sieve and Hydrometer

Method: ASTM D422-63

Analyzed: 3/16/94

Sample Description: 90%

Lab ID: 9408826-03

Client ID: EG2-VMPB-2-4

SIEVE TEST

A. Total weight of semple:

B. Weight retained in No.10 sieve:

C. % passing No.10 sieve:

226.88 g 1.19 g 89.47 %

Sieve test for weight rotained in a No.10 sieve.

				QUMULATIVE
	MEIGHT	%	CUMULATIVE	COMMUCATIVE
AIFVE SIZE	RETAINED(g)	RETAINED	X RETAINED	K PASSING
1 1/2 計	0.00	0.00	0.00	100.00
3/8 in	0.00	0.00	0.00	100.00
No. 4	9.00	0.00	0.00	100.00
No. 19	1.19	0.53	0.53	99.47
No. 200	907 D1	91.88	92.17	7.83

#### HYDROMETER TEST

ELAPSED	TEMP.	HYDROMETER	CORRECTED		PARTICLE
TIME (min)	(deg C)	READING (H)	READING (FU	ល	QUALL to man (S)
2	20	14	10	14.7	0.0376
6	20	14	10	14.7	0.0234
10	20	13	يد	14.8	0.0166
15	20	12		15	0.0137
25	20	12	8	15	0,0106
40	\$0	11	7	15.2	0.0064
<b>eo</b>	\$0	11	7	15.2	0.000
90	20	11	1	15.2	0.0056
120	20	- 11	7	15.2	0.0049
1440	20	10	6	15.3	0.0014

* SUSPENDED
(P)
8.6
8.6
7.8
6.9
6.9
<b>5.</b> 1
8.1
6.1
6.1
5.2

Weight of soil used in hydrometer test (D):

Hydroscopic moisture serrection taster (C):

Specific gravity (Assumed):

Dispersing egent correction factor (5):

Meniscus correction factor (F):

Temp./Spec. gravity dependent constant (K):

Formules:

R=H-E-F

 $\mathbf{3} = \mathbb{K}[\mathbf{8QPT}(\mathbf{L}/\mathbf{I})]$ 

P = (R/W)100

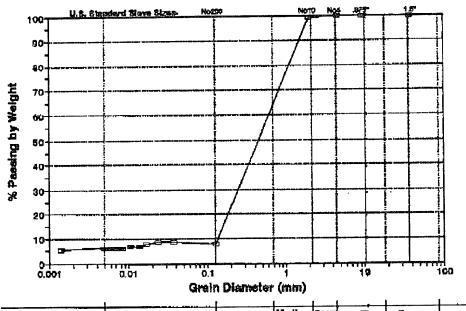
W = (J x 190)/0

D x C = L

Jon Janke

Method: ASTR 0422-63 Analyzed: 3/16/94 Lab ID: 9403625-03

#### Graph of Acquired Data



Clay Sizes	SiH Sipes	Fins	Medium	Coere	Fine	Coerso	Cobbles
Finae		6.	and		G	wavel	
	and the state of t						

Graphii	ng Data:
Pert. Diam.	Percent
(enm)	Buspended
97.5	100.00
9.5	100.00
4.5	100,00
3	99.47
0.127	7.83
0.0370	8.65
0.0234	8.65
0.0168	7.78
0.0137	8.92
0,0106	6.92
0.0084	€.08
0.0069	6.05
0.0056	6.05
0.0049	5.05
0.0014	5.19

Sample Composition:		
(1) Gravel, peeping 3-in, and		
retained on No. 4 sleve	0.0	<b>%</b>
(2) Send, passing No. 4 sieve and		
retained on No. 200 sleve	92.2	%
(3) 88t stzs, 0.074 to 0.005 mm	1,8	<u></u> %
(4) Clay size, emeiler than 0.005 men	8.1	%

TO

730307.502

FIGURE B.2

			OF CUST	CHAIN OF CUSTODY RECORD		.   		b topod	
ENCRETERM	ENCREERING-SCIENCE, MC.	APCER BUOWEATTHM PRICH TESTS	918	Proof	6		10. 4.48 A. A. A	F. The Markie Court	S. S
two brach duta 1, state wis bethever, cor obsert dues incar see		Boos FELIN AFE		Ž		¥64	<u>.</u>	PACE LABORATORY	
		the all East FTA	,4		A LE		<b>∓</b> ≵	9	•
E 26. 43.	8	( 500 50		2000		(	₹	Attri-Stacy-Hook Bestor	
Scarge (Physical Control	I OLA	A- A 605 16CA		ANTA ALKA) PROM PROM	CETTE CREATE CACAT			(MA) 1892-9186 (MA) 1892-9266	
	, Chi	of Survey !		d sec d core	זו נ	) (7			
2		Search Boardalon	(c) (b) ed	e me Cas V cas Cas	e se em	ron E j	.8	Months	
20 July 11/195	1000	VB) - 3!	1		1)			1908	
*								EOIL.	
7/1/20	6.0	Mos - 261	4	>	)	7	90	#Cit.	
200						Separation 1		GETHE.	
Willing A	1 498	VA08 _ 1-4'	100	7	>		0	POAT.	
3					-		er patricipal a	75	
				d de la constante de la consta	<u> </u>	nd sub-Mil	49	750	
							0	100	
							0	75	
						,	<b>t</b> 3	162	
							9		
							63		
							0		
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		The control of the co					0	dot.	
							0		
	Montena	Sarto V Unios   Bacobovod hor Labor	Man of the state				Sharen Cler	1	
No.		Z Z	reo èl		2-4			13.7.94	
	Sur-contract		And Among	(DA/E)	3.4	وم	9-0	G - Gard Bangida, G - Compadia Georgia	
						MEFFER	9	CALCINET POPERTY INC.	
Pedend Reposes (Assess)		Februal Experies Namber:	·	(4) (4)		oftensing the	to see	The Browhern, Living Std Derver, Cabarado	
Alben Combon	<b>)</b>	CYXX	gji- ·					Company	_
		0622	7290988110						

#### APPENDIX D

PERMEABILITY TEST AND BIODEGRADATION RATE CALCULATIONS FOR HURLBURT FTA

# HURLBURT EGLIN AFB / EG3 / EGLIN-FTA Steady-state Equation — Air Injection

Enter data

Calculated data

Where:

Q = Volumetric flow rate of vent well

13.0 scfm x  $(30.48 \text{ cm/ft})^3$  x (1 min/60 s) =

6.14E+03 cm<sup>3</sup>/s

 $\mu$  = Viscosity of Air @ 18° C =

1.80E - 04 g/cm s

Patm = Ambient pressure @ 200 feet of elevation

403 inches H2O x (3.61E-2 psia/in. H2O) =

14.548 psia

14.548 psia x  $(6.89476E4 \text{ g/cm s}^2)/\text{psia} =$ 

1.00E + 06 g/cm s<sup>2</sup>

Rw = Radius of Vent Well

 $\boxed{2}$  inches x 2.54 cm/in =

5.08 cm

H = Depth of Screen (length of screened interval)

 $\frac{5}{100}$  feet x 30.48 cm/ft =

152 cm

Ri = Maximum Radius of Venting Influence

75 feet x 30.48 cm/ft

Esta FTH

2286 cm

Pw = Absolute Pressure at Vent We

40 inches H2O x (3.611

1.444 psia

1.444 psia +

15.992 psia

15.992 psia x (6.89476E4 g/cm s<sup>2</sup>)/psia =

1.10E+06 g/cm s<sup>2</sup>

k =

6.742E-08 cm<sup>2</sup>

6.740E-08 cm<sup>2</sup> x (1 m/100 cm)<sup>2</sup> =

 $6.700E-12 \mid m^2$ 

6.700E-12 m<sup>2</sup> x 1 darcy/(9.870E-13 m<sup>2</sup>) =

6.79 darcys

40.500			
Air Permeabil	ity Test - Data	Analysis (cont.)	
Enter radial	r = 40 (ft)	r= 40 (ft)	r= 20 (ft)
distances of monitoring points	(min) (in H2O)	(min) (in H2O)	r= 20 (ft) (min) (in H2O)  1 1.1 1 2 2.6 3 3.5 4 4.1 5 4.5 4.5 6 6 .4.9 7 5.1 8 5.3 9 5.5 10 5.7 1
	1 - 0 쇼	1 0 企	1 1.1
Enter measured -	2 0.35	2 0.4	2 2.6
(2) times and gauge	3 ~0.7	3 0.8	3 3.5
vacuums	4 1.1	4 1.2	4 4.1
(3) Enter (optional):	5 1.35	5 1.45	5 4.5
	6 .1.6	6 1.7	6 4.9 5.1
a) flowrate	7 1.75	7 1.85	7 5.1
13(SCFM)	8 1.9	8 2.0	8 5:3
b) screened interval	9 2.05	9 2.15	9 5.5
thickness	10 2.15	10 2.25 🖓	10 5.7 🗸
5(ft)	clear	clear	clear
	= 26.5976 darcy (A)	k = 26.2783 darcy (A)	k= 14.9901 darcy (A)
>Calculate<	= 56.5948  damy(B)	k = 60.5987 darcy(B)	k = 46.6908  darcy (B)
		-A	ation & Chatistics ADO
(iii	K	eturn Explan	ation & Statistics AP8

Q CBNB au

Air Permeabil  Enter radial	r= 40	r – Data T(ft)	r= 40	(ro)	r= 20	(ft)
distances of monitoring points	· - L	(179 in H2O)		(in H2O)	<u> </u>	1 H2O)
unitabilité boure	12	2.3 企	12	2.4 🗘	12	6.0 🗘
Enter measured	14	2.45	14	2.5	14	6.1
(2) times and gauge	16	2.5	16	2.6	16	6.3
vacuums	18	2.6	18	2.7	18	6.4
(3) Enter (optional):	20	2.65	20	2.75	20	6.5
	23	2.7	23	2.8	23	6.6
a) flowrate	26	2.75	26	2.75	26	6.7
13 (SCFM)	29	2.8	29	2.9	29	6.7
b) screened interval	32	2.85	32	2.95	32	6.8
thickness	35	2.85 🕂	35	2.95	35	6.9 🖓
5 (ft)	clear	$\mathbf{c}$	clear	O C	clear	)
Colemiatac	= 26.5976 = 56.5948	darcy(A) darcy(B)	k= 26.278 k= 60.598		k= 14.9901 k= 46.6908	darcy (A)

## Air Permeability Test - Data Analysis (cont.)

On the previous Card (AP8), the data you input were fit to the approximate expression given on Card AP6. It was analyzed using both methods described on card AP7, if you input values for the extraction well flowrate (Q) and the stratum thickness (m). Below each column of data, the two calculated permeability values are denoted by:

darcy(A) - refers to calculation method 1 (see Card AP7)

darcy(B) - refers to calculation method 2 (see Card AP7)

During the regression analyses, the data expressed as pairs of points (ln(t), P') are fit to a line. The "correlation coefficient", r, is a measure of how well the data conform to the theoretical curve. As r-->1, the data points all fall on the theoretical curve. At the right are given the correlation coefficient values for the three data sets. For more info on the meaning of r, consult any introductory Statistics book.

Correlation Coef.

(r)

data set #1 0.987386

data set #2 0.986659

data set #3 0.980926

Return

AP9

Eglin ASB / Lite EG3

Air Permeabil	ity Tes mea- r= 10	t - Data	Analysi r= 10	L	r= 20	
distances of monitoring points	(min) (	in H2O)	(min)	(in H2O)	(min) (i	n H2O)
Enter measured →	1 2	4.0 <del>企</del> 6.1	1 2	5.0 <u>企</u> 7.0	1 2	(ft) 1.1 \( \frac{1}{4} \) 2.2 \( \frac{2}{9} \) 3.3 \( \frac{3}{3.6} \) 3.9 \( \frac{4}{3} \) 4.1 \( \frac{4}{3} \) 4.55 \( \frac{1}{4} \)
2) times and gauge	3	7.25	3	8.0	3	2.9
vacuums  (3) Enter (optional):	4 5	7.9 8.4	5	8.5 9.0	4 5	3.3 3.6
a) flowrate	6	8.75 9.0	6	9.25 9.6	6	3.9 4.1
13 (SCFM)	8	9.2	8	9.8	8	4.3
b) screened interval thickness	9 10	9.4 9.9 <b>▽</b>	9 10	10.0 10.1 ₹}	9 10	4.4 4.55 ⟨ <b>⟩</b>
	Clean		Clea	D	Clean	<u> </u>
>Calculate< k		darcy (A) darcy (B)	k= 14.347 k= 149.96		k= 19.8652 k= 57.4058	— ' ' ' ' '
		Ca (Re	turn ) 🕻	Explan	ation & Statis	tics AP8

Air Permeabil	ity Test - D	ata Analy	șis (cont.)	)	
Enter radial distances of monitoring points	r = 10  (ft) $(min)  (in H2C)$	r= (min)	10 (ft) (in H2O)	r = 20	(ft) n H2O) 4.75 (1) 4.9 5.0 5.05 5.15 5.2 5.3 5.35 5.4 (1)
Enter measured —  2 times and gauge  vacuums	14 10.0 16 10.2 18 10.3 20 10.4	14	10.4 LF 10.5 10.75	14 16 18	4.9 5.0 5.05
3 Enter (optional):	23 10.5 26 10.7 29 10.75	5 20 7 23	11.0 11.0	20 23 26	5.15 5.2 5.3
13 (SCFM) b) screened interval thickness	32 10.8 35 10.9 38 10.99	29 9	11.1 11.25	29 32 35	5.35 5.4 5.4 (ひ)
k= 13.5935 darcy(A) k= 14.3471 darcy(A) k= 19.8652 darcy(A)					
>Calculate<					

# Air Permeability Test - Data Analysis (cont.)

On the previous Card (AP8), the data you input were fit to the approximate expression given on Card AP6. It was analyzed using both methods described on card AP7, if you input values for the extraction well flowrate (Q) and the stratum thickness (m). Below each column of data, the two calculated permeability values are denoted by:

darcy(A) - refers to calculation method 1 (see Card AP7)

darcy(B) - refers to calculation method 2 (see Card AP?)

During the regression analyses, the data expressed as pairs of points (ln(t), P') are fit to a line. The "correlation coefficient", r, is a measure of how well the data conform to the theoretical curve. As r-->1, the data points all fall on the theoretical curve. At the right are given the correlation coefficient values for the three data sets. For more info on the meaning of r, consult any introductory Statistics book.

Correlation Coef.

(r)

data set #1 | 0.968318 |

data set #2 0.972764

data set #3 0.981263

Return

APQ

#### EGLIN AFB (Hurlburt) - INITIAL - MPA-D(5) Biodegradation Rate Calculations enter data

calculated data

Formula:

$$K_h = K_o \times 1/100\% \times A \times D_o \times C$$
 Where:

 $K_h$  = fuel biodegradation rate

 $K_0 = O_2$  utilization rate (%/min.)

A = volume of air/kg soil

$$D_0 = O_2$$
 density

1340 mg/L

 $C = Carbon/O_2$  ratio for hexane mineralization = 1/3.5

Test Results:

K<sub>o</sub> = max. observed rate moisture content

0.0029 %/min. 5.8 %

Assume:

Soil properties for | Mixed grained sand, loose Specify from

Table 1.4 (Ref. Foundation Engineering, Peck, Hanson, and Thomburn,

John Wiley Press, 1974)

Porosity:

0.40  $_{\mathbf{g}} \mathbf{d} = \mathbf{g}$ 1.59

Unit weight (dry):

Void ratio: e = n/1 - n =0.67

Specific gravity:

$$G = 2.65$$

Calculate A = Air filled volume  $(V_3)$ /unit wt.

Solving for 1 liter of soil

a)  $V_v = n * 1 L$ 

 $V_v =$  0.4 liters  $V_v =$  void volume

b) 
$$S_r = Gw/e$$
  
 $S_r = 0.23$ 

S, = degree of saturation

c) 
$$V_w = S_r \times V_v$$
  
 $V_w = 0.09$  liters  $V_w = volume of water$ 

e) Bulk density =  $^g$ d + ( $V_w \times ^g$ w) = 1.7 kg/l soil

f)  $A = V_a/Bulk density =$ 

0.182 | air/kg soil

 $K_h = K_0 \times 1/100\% \times A \times D_0 \times C \times 525,600 \text{ min/yr} = 1062 \text{ mg TPH/year}$ 

EGLIN AFB (Hurlburt) - INITIAL - MPB-D(5) **Biodegradation Rate Calculations** enter data

calculated data

Formula:

$$K_b = K_o \times 1/100\% \times A \times D_o \times C$$
 Where:

 $K_h$  = fuel biodegradation rate

 $K_0 = O_2$  utilization rate (%/min.)

A = volume of air/kg soil

$$D_0 = O_2$$
 density 1340 mg/L

 $C = Carbon/O_2$  ratio for hexane mineralization = 1/3.5

**Test Results:** 

 $K_0 = \text{max. observed rate}$ moisture content

0.0026 %/min. %

Assume:

Soil properties for Mixed grained sand, loose Specify from

Table 1.4 (Ref. Foundation Engineering, Peck, Hanson, and Thornburn,

John Wiley Press, 1974)

Porosity:

0.40

Unit weight (dry):

 $^{g}d =$ 1.59 0.67

Void ratio: e = n/1 - n = 0Specific gravity:

$$G = 2.65$$

Calculate A = Air filled volume (V<sub>a</sub>)/unit wt.

Solving for 1 liter of soil

a) 
$$V_v = n * 1 L$$

 $V_v =$  0.4 liters  $V_v =$  void volume

$$S_r = 0.28$$

b)  $S_r = Gw/e$   $S_r = 0.28$   $S_r = degree of saturation$ 

c) 
$$V_w = S_r \times V_v$$
  
 $V_w = 0.11$  liters  $V_w = volume of water$ 

d)  $V_a = V_v - V_{vw}$   $V_a = \boxed{\phantom{A}}$ 

$$V_{w} = 0.29$$
 liters  $V_{w} = volume of water$ 

e) Bulk density =  $^g$ d + ( $V_w \times ^g$ w) = 1.7 kg/l soil

f) A = V<sub>a</sub>/Bulk density =

0.171 | I air/kg soil

 $K_b = K_o \times 1/100\% \times A \times D_o \times C \times 525,600 \text{ min/yr} = 895 \text{ mg TPH/year}$ 

EGLIN AFB (Huriburt) - INITIAL - MPC-S(3) Biodegradation Rate Calculations

enter data

calculated data

Formula:

$$K_b = K_o \times 1/100\% \times A \times D_o \times C$$
 Where:

 $K_h$  = fuel biodegradation rate

 $K_0 = O_2$  utilization rate (%/min.)

A = volume of air/kg soil

$$D_0 = O_2$$
 density

1340 mg/L

 $C = Carbon/O_2$  ratio for hexane mineralization = 1/3.5

Test Results:

$$K_o = \text{max. observed rate}$$
  
 $w = \text{moisture content}$ 

Assume:

Soil properties for Mixed grained sand, loose Specify from

Table 1.4 (Ref. Foundation Engineering, Peck, Hanson, and Thornburn,

John Wiley Press, 1974)

Porosity:

0.40  $_{g}d =$ 1.59

Unit weight (dry):

0.67

Void ratio: e = n/1 - n =Specific gravity: G = n/1 - n =Specific gravity:

$$G = 2.65$$

Calculate A = Air filled volume  $(V_a)$ /unit wt.

Solving for 1 liter of soil

a)  $V_v = n * 1 L$ 

 $V_v =$  0.4 liters  $V_v =$  void volume

b) 
$$S_r = Gw/e$$

$$S_r = \boxed{ 0.23}$$

 $S_r = \text{degree of saturation}$ 

c)  $V_w = S_r \times V_v$   $V_w = \boxed{0.09} \text{ liters } V_w = \text{volume of water}$ 

d) 
$$V_a = V_v - V_{vw}$$

$$V_a = \boxed{ 0.31} \text{ liters } V_w = \text{volume of water}$$

e) Bulk density =  $^g$ d + ( $V_w \times ^g$ w) = 1.7 kg/l soil

f)  $A = V_a/Bulk density =$ 

0.182 I air/kg soil

 $K_b = K_o \times 1/100\% \times A \times D_o \times C \times 525,600 \text{ min/yr} = 1245 \text{ mg TPH/year}$ 

#### APPENDIX E

PERMEABILITY TEST AND BIODEGRADATION RATE CALCULATIONS FOR EGLIN FTA

#### EGUN EGLIN AFB / HURLBURT FTA Steady-state Equation – Air Injection

Enter data

Calculated data

Where:

Q = Volumetric flow rate of vent well

92.0 scfm x (30.48 cm/ft)<sup>3</sup> x (1 min/60 s) =

4.34E+04 cm<sup>3</sup>/s

 $\mu$  = Viscosity of Air @ 18° C =

1.80E-04 g/cm s

Patm = Ambient pressure @

200 feet of elevation

403 inches H2O x (3.61E-2 psia/in. H2O) =

14.548 psia

14.548 psia x  $(6.89476E4 \text{ g/cm s}^2)/\text{psia} =$ 

1.00E + 06 g/cm s<sup>2</sup>

Rw = Radius of Vent Well

2 inches x 2.54 cm/in =

5.08 cm

H = Depth of Screen (length of screened interval)

35 feet x 30.48 cm/ft =

1067 cm

Ri = Maximum Radius of Venting Influence

65 feet x 30.48 cm/ft =

1981 cm

Pw = Absolute Pressure at Vent Well

inches H2O x (3.61E-2 psia/in. H2O) =

0.144 psia

0.144 psia +

14.548 psia =

14.693 psia

14.693 psia x  $(6.89476E4 \text{ g/cm s}^2)/\text{psia} =$ 

1.01E+06 g/cm s<sup>2</sup>

k =

6.953E-07 cm<sup>2</sup>

6.953E-07 cm<sup>2</sup> x (1 m/100 cm)<sup>2</sup> =

6.950E-11 m<sup>2</sup>

6.950E-11 m<sup>2</sup> x 1 darcy/(9.870E-13 m<sup>2</sup>) =

70.42 darcys

HyperVentilate® 1991

Air Permeabil	itv Test	- Data	Analysi	s (cont.)	1		
Enter radial distances of monitoring points	r= 20 (ft) (min) (in H2O)		r= 10	r= 10 (ft) (min) (in H2O)		10 100	
Enter measured —  2 times and gauge  vacuums	1 2 3 4	0.5 👉 .8 🗍 .95	3 4	.85 🖸 1.2 🗍 1.25	1 2 3 4	1.1 (1) 1.45 1.65 1.75 1.8 1.85 1.90 1.90	
3 Enter (optional): a) flowrate	5 6 7	1.1 1.15 1.17	5 6 7	1.5 1.5 1.55	5 6 7	1.75 1.8 1.8	
92 (SCFM) b) screened interval thickness	8 9 10	1.2 1.22 1.25 ↔	8 9 10	1.55 1.6 1.65 <b>▽</b>	8 9 10	1.85 1.90 1.90 <del>⟨</del> }	
🐯>Calculate< 📗	clear  clear  77.4965 darcy (A)  = 97.3548 darcy (B)		clear k= 82.8652 dercy (A) k= 109.285 dercy (B)		clear k= 84.0329 darcy (A) k= 305.225 darcy (B)		
	- [77.3340]		turn C		ation & Statis		

CC BAB. 6-13-94

Air Permeabil	ity Tes	t - Data	Analysi	is (cont.)	)	
Enter radial distances of monitoring points	12	in H2O)	12	(in H2O)	12	n H2O)
Enter measured — times and gauge vacuums	14 16 18.5	1.42 1.45 1.46	14 16 19	1.8 1.8 1.8	14 16 19	2.05 2.05 2.05
3 Enter (optional): a) flowrate	20.33 22.5 26	1.5 1.5 1.55	20 23 26	1.85 1.85 1.85	20 23 26	2.05 2.1 2.15
92 (SCFM) b) screened interval thickness	29 32 35	1.6· 1.6 ☐ 1.7 ▽	29 32 35	1.9 1.95 1.9 ↔	29 32 35	2.15 2.20 2.20 🖓
k = 77.4965 darcy (A) $k = 82.8652$ darcy (A) $k = 84.0329$ darcy (A)						darcy(A)
	31.0040	-	turn C		ation & Statis	

## Air Permeability Test - Data Analysis (cont.)

On the previous Card (AP8), the data you input were fit to the approximate expression given on Card AP6. It was analyzed using both methods described on card AP7, if you input values for the extraction well flowrate (Q) and the stratum thickness (m). Below each column of data, the two calculated permeability values are denoted by:

darcy(A) - refers to calculation method 1 (see Card AP7) darcy(B) - refers to calculation method 2 (see Card AP7)

During the regression analyses, the data expressed as pairs of points (ln(t), P') are fit to a line. The "correlation coefficient", r, is a measure of how well the data conform to the theoretical curve. As r-->1, the data points all fall on the theoretical curve. At the right are given the correlation coefficient values for the three data sets. For more info on the meaning of r, consult any introductory Statistics book.

Correlation Coef.

(r)

data set #1 0.994199

data set #2 0.985485

data set #3 0.984607

Return

AP9

Eglin AJB/ITA/MPB-M, MPB-D

Air Permeabil	ity Test	- Data	Analysi	s (cont.)	) )	
Enter radial	r= 20	(ft)	r= 20	(ft)	r=	(ft)
distances of monitoring points	(min) (i	n H2O)	(min) (	(in H2O)	(min)	(in H2O)
<b>61</b>	1	.55 쇼	1	0.05 企		다 다
$\sum$ Enter measured $\longrightarrow$	2	.85	2	0.05		9999
(2) times and gauge	3	.95	3	0. <b>0</b> 5		
vacuums	4	1.05	4	0.05		
3 Enter (optional):	5	1.1	5	0. <b>0</b> 5		
a) flowrate	6	1.15	6	0.05		
· ,	7	1.15	7	0.05		
92 (SCFM)	8	1.2	8	0.05		
b) screened interval	9	1.25	9	0.05		
thickness	10	1.25 🖓	10	0.05		
35(ft)	( <u>clear</u>	)	(clear	ン	(cle	er)
	= 89.3732	damy(A)	k= 620789	9 darcy (A)	k=	darcy (A)
>Calculate< k	= 169.313	darcy (B)	k= INF	damy(B)	k=	darcy(B)
<b>√</b> ₹				~~~~~		
Return Explanation & Statistics AP8						

O comb

Air Permeabil	ity Test - Da	ta Analysis (cont.	)
Enter radial	r= 20 (ft)	r= 20 (ft)	r=(ft)
monitoring points	(min) (in H2O)	(min) (in H2O)	(min) (in H2O)
	12 1.3	12 0.05 企	
$\sum$ Enter measured $\longrightarrow$	14 1.4	14 0.05	
(2) times and gauge	16 1.4	16 0.05	
vacuums	19 1.45	19 0.05	
(3) Enter (optional):	20 1.45	20 0. <b>0</b> 5	
	23 1.45	23 0.05	
a) flowrate	26 1.50	26 0.05	
92 (SCFM)	29 1.55	29 0. <b>0</b> 5	
b) screened interval	32 1.55	32 0.05	
thickness	35 1.5 ₹	35 0.05 (ひ)	₹
35(ft)	clear	clear	clear
a) flowrate  92 (SCFM) b) screened interval thickness  35 (ft) >Calculate< k	= 89.3732 darcy (A) = 169.313 darcy (B)		r=(ft) (min) (in H2O)  Clear  k=darcy(A) k=darcy(B)
		Return Explan	ation & Statistics   AP8

## Air Permeability Test - Data Analysis (cont.)

On the previous Card (AP8), the data you input were fit to the approximate expression given on Card AP6. It was analyzed using both methods described on card AP7, if you input values for the extraction well flowrate (Q) and the stratum thickness (m). Below each column of data, the two calculated permeability values are denoted by:

darcy(A) - refers to calculation method 1 (see Card AP7)

darcy(B) - refers to calculation method 2 (see Card AP7)

During the regression analyses, the data expressed as pairs of points (ln(t), P') are fit to a line. The "correlation coefficient", r, is a measure of how well the data conform to the theoretical curve. As r-->1, the data points all fall on the theoretical curve. At the right are given the correlation coefficient values for the three data sets. For more info on the meaning of r, consult any introductory Statistics book.

Correlation Coef.

(r)

data set #1 0.989789

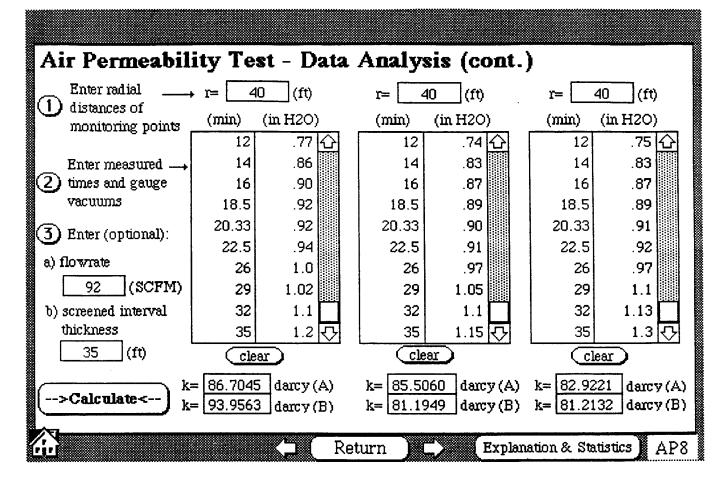
data set #2 -NAN(00

data set #3 No Data

Return

AP9

Air Permeahil	ity Test	- Data	Analysis	s (cont.)	<u> </u>	
Air Permeabil  Enter radial  distances of	<i>mpc</i> . r= 40	(ft)	r= <u>40</u>	(ft)	r= 40	(ft) .H2O) .12 \(\frac{1}{4}\) .32 \(\frac{1}{2}\) .44 \(\frac{1}{2}\) .52 \(\frac{1}{2}\) .57 \(\frac{1}{2}\) .62 \(\frac{1}{2}\) .64 \(\frac{1}{2}\) .66 \(\frac{1}{2}\)
monitoring points	(min) (i	n H2O)	(min) (i	n H2O)	(min) (in	H2O)
Enter measured	1 2	.12 🔐	1 2	.11 ( <u>1</u> ) .30	1 2	.12 (1) .32
2) times and gauge	3	.45	3	.42	3	.44
vacuums	4	.54	4	.49	4	.52
3 Enter (optional):	5 6	.59 .62	5 6	54 57	5	.57 .59
a) flowrate	7	.65	7	.61	7	.62
92 (SCFM)	8	.67	8	.63	8	.64
b) screened interval thickness	9	.69	9	.64	9	.66
35 (ft)	[ 10 .72 ⟨√⟩		10 .68 🗸		10 .70 🖓	
(>Calculate<) k	= 86.7045	darcy (A) darcy (B)	k= 85.5060 k= 81.1949	<b>⊣</b> '`'	k= 82.9221 k= 81.2132	darcy(A)
			turn ) =>		ation & Statisti	cs AP8



## Air Permeability Test - Data Analysis (cont.)

On the previous Card (AP8), the data you input were fit to the approximate expression given on Card AP6. It was analyzed using both methods described on card AP7, if you input values for the extraction well flowrate (Q) and the stratum thickness (m). Below each column of data, the two calculated permeability values are denoted by:

darcy(A) - refers to calculation method 1 (see Card AP7)

darcy(B) - refers to calculation method 2 (see Card AP7)

During the regression analyses, the data expressed as pairs of points (ln(t), P') are fit to a line. The "correlation coefficient", r, is a measure of how well the data conform to the theoretical curve. As r-->1, the data points all fall on the theoretical curve. At the right are given the correlation coefficient values for the three data sets. For more info on the meaning of r, consult any introductory Statistics book.

Correlation Coef.

(r)

data set #1 0.992033

data set #2 0.991906

data set #3 0.977866

Return

AP9

## EGLIN AFB (EG2) - INITIAL - MPA-S Biodegradation Rate Calculations

enter data

calculated data

Formula:

$$K_b = K_o \times 1/100\% \times A \times D_o \times C$$
 Where:

 $K_h$  = fuel biodegradation rate

 $K_0 = O_2$  utilization rate (%/min.)

A = volume of air/kg soil

 $D_0 = O_2$  density 1340 mg/L

 $C = Carbon/O_2$  ratio for hexane mineralization = 1/3.5

Test Results:

 $K_o = \text{max. observed rate}$ 

0.0042 %/min.

w = moisture content

6.8 | %

Assume:

Soil properties for Mixed grained sand, loose Specify from Table 1.4 (Ref. Foundation Engineering, Peck, Hanson, and Thornburn, John Wiley Press, 1974)

Porosity:

0.40

Unit weight (dry):

1.59  $^{\rm g}d=$ 

Void ratio:

 $e = n/1 - n = \frac{1}{2}$ 0.67

Specific gravity:

2.65

Calculate A = Air filled volume (V<sub>a</sub>)/unit wt.

Solving for 1 liter of soil

a) 
$$V_v = n * 1 L$$

 $\overline{0.4}$  liters  $V_v = \text{void volume}$ 

b)  $S_r = Gw/e$   $S_r = 0.27$ 

 $S_r = degree of saturation$ 

0.11 liters  $V_w = \text{volume of water}$ 

d)  $V_a = V_v - V_{vw}$  $V_a =$ 

0.29 liters  $V_w = \text{volume of water}$ 

e) Bulk density =  $^g$ d + ( $V_w \times ^g$ w) = 1.7 kg/l soil

f)  $A = V_a/Bulk density =$ 

0.171 | I air/kg soil

 $K_b = K_o \times 1/100\% \times A \times D_o \times C \times 525,600 \text{ min/yr} = 1445 \text{ mg TPH/year}$ 

enter data

calculated data

Formula:

$$K_b = K_0 \times 1/100\% \times A \times D_0 \times C$$
 Where:

 $K_h$  = fuel biodegradation rate

 $K_0 = O_2$  utilization rate (%/min.)

A = volume of air/kg soil

$$D_0 = O_2$$
 density 1340 mg/L

 $C = Carbon/O_2$  ratio for hexane mineralization = 1/3.5

Test Results:

 $K_0 = \text{max. observed rate}$ moisture content

Assume:

Soil properties for Mixed grained sand Specify from

Table 1.4 (Ref. Foundation Engineering, Peck, Hanson, and Thornburn,

John Wiley Press, 1974)

Porosity:

0.35

Unit weight (dry):

Unit weight (dry): 
$$gd = 1.72$$
  
Void ratio:  $e = n/1 - n = 0.54$ 

Specific gravity:

$$G = \frac{71/7 - 77}{6} = 0.54$$

Calculate A = Air filled volume  $(V_a)$ /unit wt.

Solving for 1 liter of soil

a) 
$$V_v = n * 1 L$$

$$V_v =$$
 0.35 liters  $V_v =$  void volume

$$S_r = degree of saturation$$

c) 
$$V_w = S_r \times V_v$$

c) 
$$V_w = S_r \times V_v$$
  
 $V_w = \boxed{ 0.12}$  liters  $V_w = \text{volume of water}$ 

$$V_{w} = volume of water$$

$$V_{v} = V_{v} - V_{v}$$

d) 
$$V_a = V_v - V_{vw}$$
  
 $V_a = 0.23$  li

0.23 liters 
$$V_w = \text{volume of water}$$

e) Bulk density = 
$$^g$$
d + ( $V_w \times ^g$ w) = 1.8 kg/l soil

$$K_b = K_o \times 1/100\% \times A \times D_o \times C \times 525,600 \text{ min/yr} = 902 \text{ mg TPH/year}$$

EGLIN AFB (EG2) - INITIAL - MPC-D(39)

**Biodegradation Rate Calculations** 

enter data

calculated data

Formula:

$$K_h = K_o \times 1/100\% \times A \times D_o \times C$$
 Where:

 $K_h =$ fuel biodegradation rate

 $K_0 = O_2$  utilization rate (%/min.)

A = volume of air/kg soil

$$D_0 = O_2$$
 density

1340 mg/L

 $C = Carbon/O_2$  ratio for hexane mineralization = 1/3.5

Test Results:

 $K_0 = \text{max. observed rate}$ moisture content

Assume:

Soil properties for Mixed grained sand, dense Specify from Table 1.4 (Ref. Foundation Engineering, Peck, Hanson, and Thornburn, John Wiley Press, 1974)

Porosity:

0.30

Unit weight (dry):

 $^{g}d =$ 1.86

Void ratio:

e = n/1 - n =0.43

Specific gravity:

2.65 G =

Calculate  $A = Air filled volume (V_a)/unit wt.$ 

Solving for 1 liter of soil

a)  $V_v = n * 1 L$ 

 $V_v =$  0.3 liters  $V_v =$  void volume

b)  $S_r = Gw/e$   $S_r = 0.43$   $S_r = degree of saturation$ 

c)  $V_w = S_r \times V_v$   $V_w = 0.13$  liters  $V_w = volume of water$ 

d)  $V_a = V_v - V_{vw}$   $V_a = \boxed{\phantom{0}}$ 

0.17 liters  $V_w = \text{volume of water}$ 

e) Bulk density =  $^g$ d + ( $V_w \times ^g$ w) = 2 kg/l soil

f)  $A = V_a/Bulk density =$ 

0.085 I air/kg soil

 $K_b = K_o \times 1/100\% \times A \times D_o \times C \times 525,600 \text{ min/yr} = 222 \text{ mg TPH/year}$